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# Draft Environmental Impact Statement for Proposed Anoka County Refuse Derived Fuel Resource Recovery Facility



**Minnesota Pollution  
Control Agency  
Roseville, Minnesota**

**April 1986**

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## 1. EXECUTIVE SUMMARY

This Draft Environmental Impact Statement (EIS) for the Elk River refuse-derived fuel (RDF) facility, proposed jointly by Anoka County, Northern States Power Company (NSP) and the United Power Association (UPA) was prepared by the staff of the Minnesota Pollution Control Agency (MPCA) with the assistance of ERT, an engineering and environmental consulting firm. This EIS is required pursuant to Minnesota Rules Part 4410.4400, Subpart 13C. Environmental review of the project began December 24, 1985 with the distribution of the Environmental Assessment Worksheet (EAW). A public scoping meeting was held January 23, 1986. This Draft EIS and the process used to prepare it, comply with the Minnesota Environmental Quality Board (EQB) Environmental Review Program.

### 1.1 Description of the Project

Anoka County and Northern States Power Company are jointly proposing to construct a mixed municipal solid waste resource recovery facility which will recover ferrous metal, aluminum, and other recyclable materials and produce refuse-derived fuel (RDF). A small percentage of unprocessable waste will be landfilled. The RDF will be utilized at the UPA power generation station in Elk River, located 2 miles north-northwest of the proposed RDF facility. It may also be used at the NSP Willmarth power station in Mankato, or other regulated boilers which have been modified to burn RDF.

The facility will consist of a scale house, a receiving/storage building, a processing building, and an administration building. A separate receiving area for solid waste brought to the facility by private individuals will also be provided. The site for the facility is 34.7 acres located at the intersection of U.S. Route 10 and 165th Street Northwest.

The facility is intended to process 500 tons per day of mixed municipal solid waste from Anoka County, a volume which would be processed in a single processing line in one ten-hour shift. The 500 tons of solid waste will be generated in Anoka County, but the proposers are actively seeking additional waste contracts from other

sources. If additional volume is committed prior to the finalization of financing arrangements, the facility may include one or two additional processing lines which will allow a total (one-shift) daily tonnage of 1000 and 1500 tons, respectively.

## 1.2 Environmental Impacts

Environmental issues and concerns related to the project were raised during the development of the scope of the EIS. The key project issues that were incorporated into the scope of the EIS and that have been addressed in this document are:

- Air quality and odor
- Water quality
- Noise
- Traffic
- Handling and disposal of solid waste
- Land use and zoning
- Socioeconomics.

The environmental effects of the project with respect to these concerns are discussed in detail in the EIS and are summarized below.

### Air Quality and Odor

During construction of the project, the major impacts would be fugitive dust from excavation and fugitive particulate emissions associated with employee traffic and the use of heavy, earth moving equipment. These impacts would be localized and of limited duration. Measures can be taken to ensure that there would be no significant air quality impacts. Impacts due to dust generated during facility operation are expected to be insignificant. For all of the operating scenarios analyzed, emissions of all regulated pollutants ( $\text{SO}_2$ ,  $\text{NO}_2$  and lead) are less than the applicable air quality standards.

Impacts from odors associated with the processing facility are not expected to be significant. During transportation to the facility, odors will be contained within the vehicles transporting the

wastes. Dispersion of odors from the processing facility into the community will be minimized due to the enclosed facility and use of a reodorant spray in the waste receiving area.

#### Surface Water

Neither construction nor operation of any of the facility alternatives is expected to result in significant impacts to local hydrology. Storm water runoff volumes would increase with construction of the facility but any impacts of these increased flows would be eliminated by collecting the runoff in the site drainage system.. There would be no significant impacts expected upon the water quality of the Mississippi River. Wastewaters generated by washdown of refuse-handling equipment and the tipping floor will be treated at the Elk River wastewater treatment plant. The constituents of the wastewater would not cause any impact on the operation of the treatment plant, the quality of the sludge or the quality of the treated effluent.

#### Ground Water

The estimated water usage rate is a small fraction of the aquifer yield, therefore drawdown would be minimal and nearby wells would not be significantly affected. The surficial aquifer is recharged throughout a much larger area than the site, therefore the addition of impervious surface associated with the facility would not have a significant impact on the availability of groundwater in the region. All solid waste handling, residue stockpiling, and process wastewater generation on the site would occur above ground, in enclosed areas. Therefore, the potential for degradation of ground-water quality during daily facility operation would be minimal.

#### Solid Waste

Development of the proposed project would substantially reduce landfill space requirements and change the characteristics of the

wastes to be disposed. On an annual basis, approximately 25 to 35 percent of the waste stream would be landfilled versus approximately 80 percent in the absence of a resource recovery system. Individual landfills receiving ash and residuals from larger alternative facilities would experience greater rates of utilization and consequently reduced operating life.

#### Transportation

The project will result in increased truck traffic on surrounding roads during construction and operation. For all intersections potentially affected by the project, operating conditions would equal or exceed the Level of Service C acceptable operating standard for all alternative facility sizes.

#### Land Use and Zoning

The proposed site is zoned I-1, Light Industrial. Refuse processing facilities are allowed as a conditional use. Because surrounding uses are a mixture of agriculture, business and industry, development of the site as proposed is not expected to have significant adverse consequences.

#### Noise

Increases in noise due to project operation under all alternatives analyzed would be perceptible during the daytime but within the state noise standards. Nighttime noise would be barely perceptible. Noise levels at selected locations near the project site currently exceed state noise standards due to traffic on U.S. Route 10.

#### Social and Economic Conditions

The proposed facility would create employment opportunities during both construction and operation. Due to proximity to the Minneapolis-St. Paul metropolitan area, it is not expected that this

will result in an influx of persons to the area requiring new housing or new or expanded public services. As a result, there would not be any significant impacts on population and housing in Elk River and nearby Anoka County.

#### Public Health and Safety

Operation of the proposed facility will result in emissions of dioxins, furans, other organic compounds and trace metals. Three methods were utilized in estimating the potential health risk associated with the proposed facility. Utilizing the U.S. EPA TEF method based on average facility emissions results in an individual cancer risk to the maximally exposed individual of 0.1 per 100,000. Similarly, based on the use of a Swiss EPA method the risk to the maximally exposed individual is 0.9 per 100,000. Utilizing the California method the risk to the maximally exposed individual is 0.5 per 100,000 (these estimates were based on a facility average emissions rate). The Minnesota Department of Health guideline for a health risk assessment is one per 100,000. Section 6.8 contains further discussion of the detailed public health and safety assessment.

## 2. PERMIT REQUIREMENTS

The purpose of the EIS is to present information which addresses the significant environmental issues of a proposed project. It is not intended to justify a decision but rather to serve as a guide in issuing, amending, and denying permits associated with the proposed activity. Table 2-1 lists permits and approvals which are or may be required for the proposed Anoka RDF facility to be successfully implemented. As this table indicates, issuance of most of these permits is contingent upon the conclusion of the environmental impact statement process.

TABLE 2-1  
ANOKA COUNTY REFUSE-DERIVED FUEL FACILITY  
PERMITS AND APPROVALS

| <u>Permit/Approval</u>                     | <u>Agency</u>                                           | <u>Authority</u>                                                                                | <u>Comment</u>                                                                                                                                                   |
|--------------------------------------------|---------------------------------------------------------|-------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <u>State</u>                               |                                                         |                                                                                                 |                                                                                                                                                                  |
| Air emission facility permit.              | Minnesota Pollution Control Agency Air Quality Division | M.S. Sect. 226.082; Federal Clean Air Act; and regulations thereunder                           | Issuance of permit for the UPA modifications contingent upon acceptance of EIS.                                                                                  |
| Solid waste facility approval.             | MPCA Solid and Hazardous Waste Division                 | M.S. Sect. 116.081; Federal Resource Conservation and Recovery Act; and regulations thereunder. | Issuance of permit contingent upon acceptance of EIS.                                                                                                            |
| Water appropriation permit                 | Department of Natural Resources                         | M.S. Sect. 105.41                                                                               | Required for appropriations of 10,000 gallons or more per day, or 1 million gallons or more per year. Applies to construction dewatering and water supply wells. |
| Plant plumbing and potable water approval. | Department of Health                                    | MCAR 39A/Rule MHD 134                                                                           | May also be made by local government.                                                                                                                            |
| Electrical installation approval.          | Board of Electricity                                    | M.S. Sect. 326.244                                                                              |                                                                                                                                                                  |
| Designation of Waste flow.                 | Waste management district or county makes designations  | Waste Management Act<br>M.S. Sect. 115A.70                                                      |                                                                                                                                                                  |
| Industrial discharge permit                | MPCA                                                    | Clean Water Act<br>M.S. Sect. 473.501                                                           |                                                                                                                                                                  |

TABLE 2-1 (Continued)

| <u>Permit/Approval</u>                                                    | <u>Agency</u>                      | <u>Authority</u>                     | <u>Comment</u>                                                                                                                                                        |
|---------------------------------------------------------------------------|------------------------------------|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <u>Local</u>                                                              |                                    |                                      |                                                                                                                                                                       |
| Drainage permit                                                           | Anoka County<br>Watershed District | MN Watershed Act<br>Sect. 112.43     |                                                                                                                                                                       |
| Solid Waste Process-<br>ing facility construc-<br>tion/operating license. | Sherburne County                   | Sherburne County<br>waste ordinances | Issuane of permit continhent upon<br>acceptance of EIS. Must be consistent<br>with Solid Waste Management Plan.                                                       |
| Conditional Use Permit                                                    | Elk River Planning<br>Commission   | Elk River ordinances                 | Conditional use tabled by Planning<br>Commission until draft EIS is available.                                                                                        |
| Building/construc-<br>tion permits                                        | Elk River                          | Elk River ordinances                 | Wells must meet Health Department<br>requirements. Fire protection system<br>must meet fire code requirements. All<br>applicable codes and ordinances must be<br>met. |

### 3. SOLID WASTE MANAGEMENT PLANNING

This chapter addresses the current status and evolution of solid waste planning in Anoka County and the relationship of the proposed facility to these planning efforts. The following paragraphs provide an overview of the regulatory framework governing solid waste management, key solid waste policies and plans affecting the implementation of resource recovery in Anoka County, and the role of the proposed facility in the Metropolitan region's solid waste management planning efforts<sup>1</sup>.

#### 3.1 Regulatory Framework

In 1980, prompted by the growing scarcity of landfill space, concern regarding the environmental consequences of landfilling, and technical developments in resource recovery, the Minnesota Legislature enacted the Solid Waste Management Act (the Act).

The Act designated various responsibilities and statutory authorities to cities, counties, regional governments, and state agencies in planning and controlling solid waste generation, transport and disposal. State law conformed closely with the intent and requirements of Subtitle D of the Federal Resource Conservation and Recovery Act, which provided guidelines for developing and implementing state solid waste management plans. The Act's mandate to the Metropolitan Council was to develop a long range plan for managing solid waste in the region, providing for the reduction of waste, recovery of materials and energy, and minimization of the practice of land disposal. The plan was to set regional waste management policy and provide schedules for developing waste facilities and activities to manage solid waste through the year 2000.

In the Metropolitan region, counties are directed to prepare master plans that describe and govern existing and proposed solid waste activities, functions and facilities of the county, and the cities and

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<sup>1</sup> The Metropolitan Region includes Anoka, Carver, Dakota, Hennepin, Ramsey, Scott and Washington counties.

towns within their jurisdiction. These plans in turn, are required to be consistent with the Council's guide on solid waste management. Further, the County solid waste management master plan must be submitted to the Metropolitan Council for review and approval. Municipalities and counties are authorized to own and operate solid waste disposal facilities, and have various powers with respect to financing such facilities and executing contracts involving ownership and operation.

Comprehensive solid waste management planning by the Metropolitan Council is contained in the Solid Waste Management Development Guide Policy Plan of the Metropolitan Development Guide, adopted in 1979 and amended in 1981. In 1985, the Guide was revised to give more specific direction on when facilities and services should be provided, and what their capacities should be. The Guide also provides specific implementation objectives which the Counties are to use in planning local commitments of staff, finances, authority, programs and abatement goals. The 1985 Plan of the Metropolitan Council states that by 1990, waste reduction activities can reduce solid waste generated by about five percent, source separation should reach a 15 percent recovery level, and centralized processing (transfer station/processing, waste combustion, and co-composting) can manage 80 percent of Anoka County's solid waste.

Major components and policies of the 1985 plan include the following:

- The termination of landfilling of mixed municipal solid waste after 1990. Only the nonrecoverable residuals remaining from waste processing can be landfilled after that date. In 1985, the Minnesota legislature amended the State's Waste Management Act by requiring that, after January 1, 1990, landfills in the Metropolitan area may not accept mixed municipal solid waste unless the waste has been transferred from a resource recovery facility identified by the Metropolitan Council.
- Immediate priority to separating yard waste that can be composted and recyclable materials from mixed municipal solid waste. Source separation services should be available by 1987.

- Requirement for mandatory source-separation in 1988 to encourage generation of separate recyclables and compostable yard waste materials from remaining waste if voluntary efforts have not achieved objectives of the approved County Master Plan. In 1985, the Minnesota Legislature amended the Waste Management Act to eliminate the requirement for implementation of mandatory source-separation programs by counties.
- Emphasis on reduction methods that are administratively simple to implement.
- Establishment of centrally coordinated programs for public education.
- Economic considerations alone will not determine the relative priority of waste management strategies, since the present solid waste system does not fully incorporate the total social cost of taking waste to landfills, and the future costs of controlling environmental problems.
- Waste combustion must play a key role in the future waste management system. Priority must go to a system of major MSW combustion facilities in operation by 1990.
- Co-composting is an important emerging solid waste abatement strategy which may respond to existing markets in the region.
- As a method of waste management, land disposal is a last resort.
- Cooperative arrangements among counties will be necessary if the regionwide approach is to succeed.
- Organized collection services could play a major role in implementing the regional strategy.

In the non-metropolitan counties of Minnesota, the Act also mandates solid waste management planning. Counties are required to prepare solid waste management plans which project the need for landfill capacity 10 years in the future. These plans are submitted to the Minnesota Pollution Control Agency for review and approval. On the basis of these approved plans, the MPCA issues certificates of need for landfill capacity.

The solid waste planning process is presently underway in Sherburne County, as well as in the nine other outstate counties which may ultimately be a part of the project service area. As part of the process, the outstate counties are evaluating resource recovery options, including participation in the Elk River RDF facility. the applicable solid waste management plans will require modification to reflect such participation.

Sherburne County has enacted a solid waste ordinance. That ordinance requires that a solid waste permit be obtained for a resource recovery facility. Sherburne County will also require a permit for any new ash landfills or residuals landfills within its boundaries.

The MPCA will require an air quality emission facility permit for the UPA boiler conversions. A solid waste facility permit will be required for the RDF facility. The solid waste facility permit will also address any air quality issues. Any new landfills or expansions of existing landfills will also require permit action by the MPCA. Depending upon the size and nature of such landfills, environmental review (an environmental assessment worksheet or an EIS) could also be required.

### 3.2 Anoka County Landfill Abatement Methods

In 1982, the Anoka County Board adopted its Solid Waste Management Plan, as one element of the County Comprehensive Plan. The Plan provided an overview of generation and disposal in the County, and contained general and specific objectives and policies, including: emphasis on waste processing to reduce dependence on landfilling, reliance primarily on the private sector to implement its solid waste management strategy, use of proven technologies, cooperation with other metropolitan counties, and assurance of adequate, environmentally safe landfill capacity. In 1982, the County also adopted the Land Disposal Abatement Report. The Report, as required by state law, was a proposal to reduce, to the greatest and feasible extent, the need for and practice of land disposal of mixed municipal solid waste. It reiterated many of the policies of the Metropolitan Council Guide. In addition, it set forth the County's abatement capability and issues and strategies.

In 1984, Anoka County hired a solid waste coordinator to facilitate implementation of the objectives of the Land Disposal Abatement report and the County's Solid Waste Abatement Action paper adopted earlier in the year. Also in 1984, the County began working with Northern States Power and United Power Association on a potential RDF refuse-derived fuel project and subsequently applied to the State for a 48.5 million dollar industrial bond allocation for 1985 for a resource recovery project.

Continuing efforts to bring a centralized resource recovery facility to fruition were undertaken in 1985, as were measures to achieve other landfill abatement objectives. These efforts of the County are summarized below. Further detail regarding waste designation, facility sizing considerations, and other actions affecting the proposed facility are presented in Subsection 3.3.

- The County sent letters of interest to approximately 40 resource recovery vendors.
- The County received twelve substantially complete responses and proceeded to prepare a request for financial qualifications. Subsequently, financial analyses from vendors for both 400 and 1,000 ton per day facilities were prepared. Vendors made presentations to the County Board.
- The County's consultant, Pope-Reid Associates, Inc., conducted a solid waste quantity study. Data collected during the winter, spring, summer and autumn resulted in an estimate that 562 tons per day of municipal solid waste were generated in the County on a six day per week basis. During the winter, the minimum waste generation period, the average generated per day was 451.
- The County Board adopted a policy for landfill surcharge revenues which included distribution of funds for landfill abatement programs as well as for landfill contingency, remedial action, and related activities.
- A market study was conducted to identify and evaluate businesses, industries, and institutions which could use energy from a resource recovery facility.

- County staff and their consultant, Pope-Reid, performed a siting alternative study, including evaluation of 66 areas, on the basis of natural resources, land use constraints, and other factors. Six areas in Anoka County, and one in Sherburne County, Elk River, were identified as the most suitable sites. In November, the Elk River site was designated as the primary site for the RDF facility. Both the City of Elk River and the County of Sherburne passed resolutions supporting the project concept.
- The County board adopted a policy for developing a resource recovery facility, giving priority to an RDF facility, based on a comprehensive evaluation of the alternatives.
- The County Board issued a request for proposals to three qualified vendors of RDF technology: NSP/UPA, Waste Technology International, Inc. and Swentec, Inc. The request was for a facility designed to process at least 500 tons per day. The request stated that vendors could propose a larger facility. Only NSP/UPA responded with a proposal that substantially met the RFP requirements, and was the only vendor to respond to a request for preferences for a facility site (the site in Elk River was the stated preference).
- The County entered into negotiation with NSP.
- The Anoka County Waste Designation Plan was adopted, submitted to the Metropolitan Council in June, and approved by the Council in September, 1985 (the Council included an exclusion for 50 tpd).
- The County entered into negotiations with two additional vendors, Swentec, Inc. and Blount due to an inability to reach an agreement with NSP and a desire to contract for a resource recovery project while limited opportunity for favorable IDB financing remained.
- A special County Board meeting was held to discuss vendor selection. A motion to enter into a contract with NSP was passed. Reasons cited for selection of NSP included vendor stability, flexibility of both processing capacity and

combustion facilities, and contractual provisions, providing for minimum risk avoidance. Table 3.2-1 is excerpted from the County document Comparisons of Bids and Contracts which is an evaluation of the Blount, Swentec, and NSP bids. The NSP contract provided for an RDF facility with at least one line to process 500 tons per day from Anoka County; and a two-line facility to be built if sufficient waste (minimum 685 tpd) could be contracted for from other counties. NSP has a separate contract with UPA.

TABLE 3.2-1

## COMPARISONS OF BIDS AND CONTRACTS\*

| I. Economic and Financial<br>Evaluation of Bids                                                     | <u>Blount</u>                                                                                                                                                                                                      | <u>WSP-500 tpd</u>                                                                                                                                                                                                                                          | <u>WSP-1000 tpd</u>                        | <u>Swentec</u>                                                                                    |
|-----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|---------------------------------------------------------------------------------------------------|
| A. Processing Fee                                                                                   |                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                             |                                            |                                                                                                   |
| 1. Debt Service<br>(average annual)                                                                 | \$5,910,000.00                                                                                                                                                                                                     | \$3,660,000.00                                                                                                                                                                                                                                              | \$4,846,000.00                             | \$5,823,000.00                                                                                    |
| 2. Operation and Maintenance<br>Costs (initial annual,<br>to be escalated over term<br>of contract) | In 1990:<br>\$3,983,000.00                                                                                                                                                                                         | In 1989:<br>7,022,000.00                                                                                                                                                                                                                                    | In 1989:<br>9,076,000.00                   | In 1990:<br>9,610,000.00                                                                          |
| 3. Fee per ton<br>(1987 assumptions)                                                                | \$58.53                                                                                                                                                                                                            | \$62.07                                                                                                                                                                                                                                                     | \$43.96<br>(assumes 1000<br>tpd contracted | \$61.65                                                                                           |
| II. Technology and Technical<br>Aspects of Bids                                                     |                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                             |                                            |                                                                                                   |
| A. Technology                                                                                       | Mass burn technology                                                                                                                                                                                               | RDF technology has a less                                                                                                                                                                                                                                   |                                            | Same as WSP                                                                                       |
| 1. Technical Differences                                                                            | has a long track<br>record of favorable<br>predictable perfor-<br>mance. Operation<br>and maintenance<br>costs are generally<br>less than other<br>technologies. How-<br>ever, less flexi-<br>bility to changes in | successful track record but most<br>problems have occurred in the<br>early phases. Greater flexibility<br>to deal with changes in waste stream<br>and ability to recover additional<br>components - operation and<br>maintenance costs generally<br>higher. |                                            | except as proposed<br>by Swentec the<br>technology would<br>favor a higher<br>landfill abatement. |

#### 4. PROJECT DESCRIPTION AND ALTERNATIVES

##### 4.1 Background for Proposed Action

Anoka County and Northern States Power Company (NSP) have proposed construction of a waste processing facility at a site in Elk River, Minnesota. The facility will produce a refuse-derived fuel (RDF) product and recover ferrous metals, aluminum and possibly other materials that can be economically marketed. The RDF will be burned to generate electricity in regulated boilers operated by the United Power Association and possibly by NSP at its Willmarth power generation station near Mankato. Figure 4-1 shows the resource recovery site location.

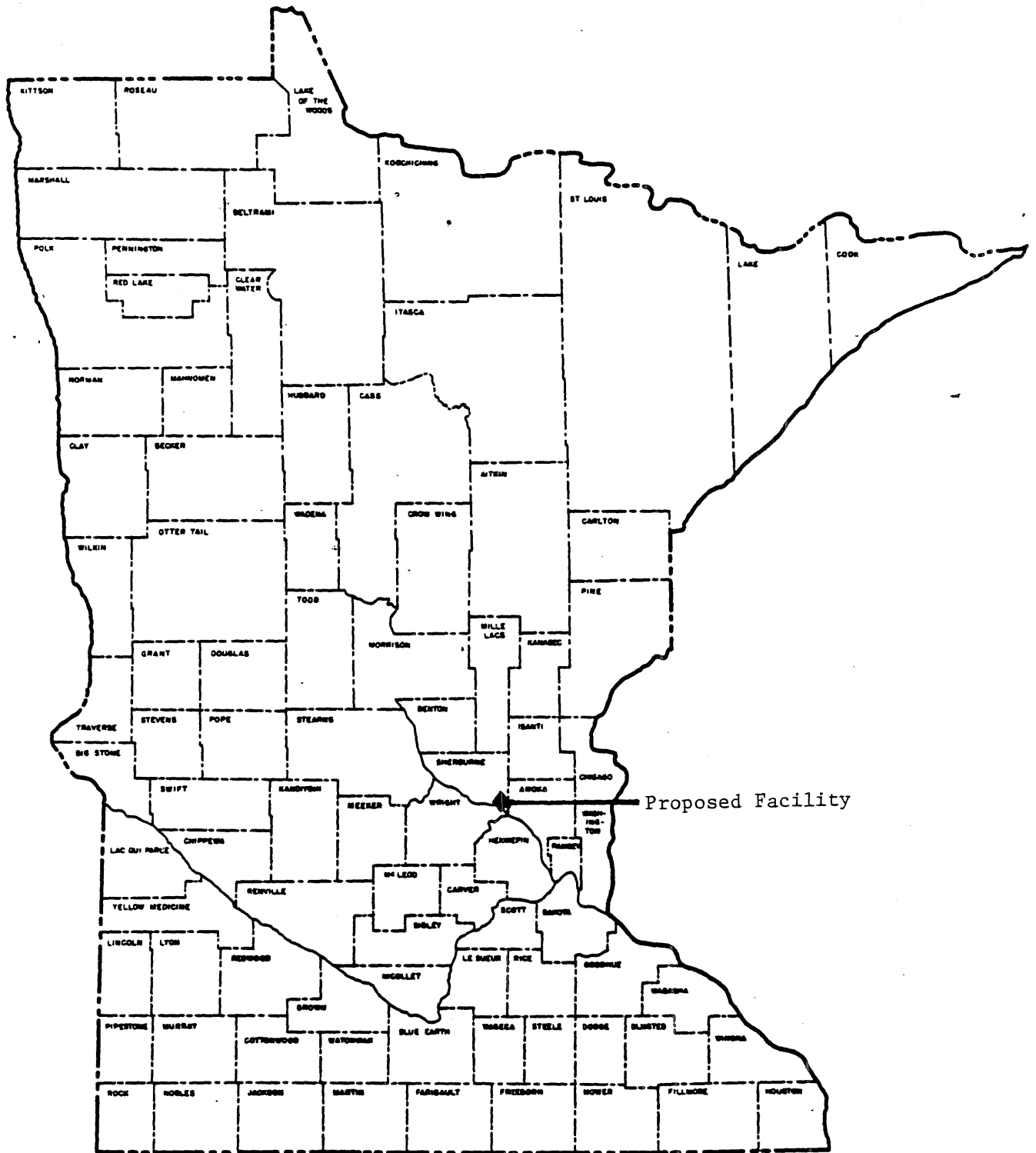
##### 4.1.1 Waste Designation and Facility Sizing Considerations

The Minnesota Legislature recognized the need for waste assurances to guarantee the economic viability of resource recovery projects, and thus established a statutory waste assurance process termed waste designation. This is defined in Minnesota Statutes, chapter 115A.81 Subd2 as follows:

"Designation means a requirement by a waste management district or county that all or any portion of mixed municipal solid waste that is generated within its boundaries or any service area thereof is deposited to a resource recovery facility identified by the district or county."

Anoka County's contract with NSP rests upon their designation plan. The designation process allows the County to enter into a long-term contract for operation of the proposed facility at a reasonable risk level. Without designation, bonding for the project would be more difficult and less favorable interest rates would be obtained.

The Anoka County designation plan provides for designation of all non-exempt solid waste generated within Anoka County to the proposed



# MINNESOTA

Figure 4-1 Project Location

Based on these analyses, NSP and Anoka County are attempting to contract for additional waste to improve the economics of the project. Contractual arrangements are being sought with other counties, among these, Hennepin County. In 1985, exclusions within Hennepin from designation authority previously granted to Richards Asphalt and Waste Energy Systems were revoked. These exclusions totalled 222 tpd. As a result of these revocations and other factors, Hennepin County has excess waste not currently arranged to be handled by a designated facility or waste reduction/recycling programs. Excess waste is estimated to be 240 tpd during the low season generation period, and an annual average of 840 tpd. Thus, in February 1986, the Metropolitan Council directed that Hennepin County must arrange for additional centralized processing capability, and that the County must:

"Negotiate with Anoka and Dakota Counties during 1986 to deliver waste not needed for the Greyhound facility, and in particular, any waste available due to revocation or cancellation of exclusion projects."

If these negotiations are unsuccessful, Hennepin County is to arrange alternative provisions for waste processing.

NSP and Anoka County are also discussing provisions for waste processing with Wright County, the Tri-County Solid Waste Commission (this includes Stearns, and Benton County and the western half of Sherburne, County), and an additional five county group (Chisago, Isanti, Kanabec, Mille Lacs, and Pine) north and northeast of Anoka. The plans proposed or in preparation by these five counties include recommendations supporting a concept to explore the Elk River Project. These five counties have undertaken a joint solid waste planning effort as the East-Central Solid Waste Commission.

None of the nine counties have undertaken weighing studies, nor are waste flows between counties restricted. Thus, waste generation estimates by county are subject to a substantial margin of error. The County has prepared a very rough estimate regarding the maximum amount of capacity which each county might contract for, based on the solid waste estimates presented and the following assumptions:

RDF facility or a transfer station or stations serving that facility. All source separated materials are exempt from designation. The Anoka County Waste Designation Plan was approved by the Metropolitan Council with the exclusion of 50 tons per day for a proposed mass burn project in Ramsey County. The proposed mass burn project in Ramsey County has since been abandoned and the exclusion is no longer in effect.

Based on the weighing study done by Pope-Reid, the County estimated in its designation plan that an average of 504 to 555 tons per day, six days per week, would be available for a resource recovery facility, year round, if no exclusions were granted. The designation plan states, however, that only 350 tons per day could prudently be guaranteed. This amount is based on the minimum waste generation period (winter), a margin of error and an assumption that the Metropolitan Council's waste management objectives for recycling and source separation may be met, thereby reducing the quantity of the solid waste stream available for processing at a centralized facility. The 350 tpd figure is conservative, but was selected given that the County's contract with NSP necessitates payment for a guaranteed tonnage, whether delivered or not (put or pay provision).

As illustrated in Table 3.2-1, which includes a comparison of costs between a 500 tpd and a 1000 tpd facility, there are significant potential cost savings from economies of scale associated with a large facility. For a 500 tpd facility, the fee per ton was projected to be \$62.07. For a 1000 tpd facility, the fee per ton was calculated to be \$43.96 (assuming 1000 tpd were contracted for). It must be emphasized that the figures in Table 3.2-1 are based on many assumptions and are subject to on-going revision. These estimates include total processing costs, including pass-through costs and development costs. Additional economic and financial analysis by NSP and the County revealed that if at least 685 tons per day could be contracted for, a two-line facility (capable of processing 1000 tpd) would be economically competitive with the smaller sized alternative. Any waste processed in addition to the 685 tpd would result in decreasing costs per ton. Further, a two-line facility would enable greater operational flexibility.

- a) 50 tons per day of Stearns County waste will be burned at an incinerator currently operating at St. Johns University.
- b) 100 tpd from Stearns County would be processed at a currently operating composting digester in St. Cloud.
- c) Approximately 85 percent of the waste in Pine and Mille Lacs County will be sent to the resource recovery facility.
- d) Of the waste potentially available (after consideration of assumptions a, b, and c), 75 percent of the average waste generated and currently being landfilled would be committed as plant capacity. This figure reflects seasonal fluctuations, recycling, composting, uncertainty about the accuracy of waste quantity estimates, and the inclusion in those estimates of waste which would not be processed at the RDF facility.

The resulting estimate of the incoming solid waste commitment from the nine counties totals approximately 500 tons per day, as indicated in Table 4.1-1. These counties, with the exception of Hennepin, are not within the Metropolitan Council's jurisdiction.

A 500 tpd or 1000 tpd facility appears to be the most likely alternative. However, if all interested parties decide to participate in the Anoka Project, a 1500 tpd facility could be supported. Elk River Boiler units I and II have a total combustion capacity of approximately 700 tons per day of refuse derived fuel, which is equivalent to approximately 1000 tons per day of municipal waste received at the RDF facility. If the third boiler were converted, the capacity would be equivalent to an annual average of 1526 tpd of waste received at the RDF facility. NSP and UPA have not completed the technical and economic studies to enable a final decision regarding the use of the third unit.

#### 4.1.2 Site Location

The proposed RDF facility will be located on a 34.7-acre site located on 165th Street just east of U.S. Route 10 in Elk River. The facility will be located adjacent to the LeFebvre & Sons, Inc. garage

TABLE 4.1-1  
WASTE FLOW TO FACILITY

| Estimate of Maximum Contracted Plant Capacity<br>(Counties other than Anoka - if participating) |                                                          |       |                                    |                            |
|-------------------------------------------------------------------------------------------------|----------------------------------------------------------|-------|------------------------------------|----------------------------|
| Solid Waste <sup>1</sup>                                                                        |                                                          |       |                                    |                            |
| County                                                                                          | Generated for Disposal -Tons/Day,<br>6 Days/Week Average |       | Tons/Day<br>6 Days/Week<br>Average |                            |
|                                                                                                 | 1984-1985                                                | 1990  | 1984-1985                          | Potentially<br>to Facility |
| Chisago <sup>2</sup>                                                                            | 49.5                                                     | 67.3  | 49.5                               | 37.1                       |
| Isanti <sup>2</sup>                                                                             | 35.1                                                     | 48.5  | 35.1                               | 26.3                       |
| Kanabec <sup>2</sup>                                                                            | 27.5                                                     | 31.6  | 27.5                               | 20.6                       |
| Mille Lacs <sup>2</sup>                                                                         | 30.3                                                     | 34.7  | 30.3                               | 22.7                       |
| Pine <sup>2</sup>                                                                               | 31.7                                                     | 34.2  | 31.7                               | 23.8                       |
| Benton <sup>3</sup>                                                                             | 69.7                                                     | 74.8  | 69.7                               | 52.3                       |
| Sherburne <sup>3</sup>                                                                          | 95.4                                                     | 119.4 | 95.4                               | 71.6                       |
| Stearns <sup>3</sup>                                                                            | 289.3                                                    | 303.3 | 289.3                              | 215.0                      |
| Wright                                                                                          | 110.8                                                    | 152.0 | 110.8                              | 40.0                       |
|                                                                                                 |                                                          |       | Total                              | 509.4                      |

\*Source: Anoka County Staff, and MPCA staff 1986: this is strictly an estimate for planning purposes and does not reflect any written or verbal agreements by any county.

<sup>1</sup> Figures should be regarded as preliminary, and apparently reflect all waste generated for disposal, not just municipal solid waste.

<sup>2</sup> Solid waste generation rate based on Hickel and Associates plans. Yardage and tonnage based on landfill receipts and interviews with haulers.

<sup>3</sup> Solid waste figures based on HDR draft plans and surveys by county staff.

TABLE 4.1-1 (Continued)

| I. Economic and Financial<br>Evaluation of Bids<br>A. Processing Fee | <u>Blount</u>                                                                                                                                                                                          | <u>NSP-500 tpd</u>                                                                                                                                                                  | <u>NSP-1000 tpd</u>                                                                                                                                                          | <u>Swentec</u> |
|----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
|                                                                      | the waste and limited<br>ability to recover<br>other components in<br>the waste stream.                                                                                                                |                                                                                                                                                                                     |                                                                                                                                                                              |                |
| 3. Experience of Vendors                                             | Blount represents the<br>W&E Technology which<br>has built and success-<br>fully operated numerous<br>similar facilities in<br>Europe. Several plants<br>are in design or con-<br>struction in Europe. | NSP represents the National Ecology<br>Technology which has built and<br>successfully operated one similar<br>plant in the U.S. Several plants<br>are in design or in construction. | Swentec represents<br>the PLM technology<br>which has built and<br>successfully<br>operated numerous<br>facilities in Europe.<br>Several plants are in<br>design in the U.S. |                |

\*Excerpted from the document prepared by Anoka County. The comparison also included: Economic and Financial Evaluation, pass through costs, revenue credits, life cycle costs; financing, debt service, schedule for issuance, bond size; construction and operation in Construction Contract, construction schedule, expansion of facility, rights and obligations, market term and options to renew; evaluation of Contractual and Associated Risks in Service Agreement; Evaluation of Bids' Relationship to the Goals and Broad Parameters of the Project.

Source: Anoka County, November 1985.

and a Mobil station situated on the corner of 165th Street and U.S. Route 10. The site is located slightly more than 1/2 mile from the Mississippi River. A permanent entry driveway for all vehicles will be located off 165th Street. Parking will be provided for approximately 35 employees.

The site of the facility has been cultivated for many years, as has the surrounding land. To the east of the proposed RDF plant is located the Nutrena Research Farm, a facility of Cargill, Inc. Residences are approximately one quarter mile to the east and northwest of the site.

The processed RDF will be used as fuel primarily for existing electric utility boilers operated by the United Power Association (UPA). The UPA power generation station in Elk River is approximately two miles north-northwest of the proposed RDF facility. The UPA facility is located on U.S. Route 10 approximately one-third mile north of the interchange of State Route 101 and U.S. Route 10. Processed RDF will be transported via transfer trailers from the proposed RDF facility to the UPA electric generating plant. A third boiler if converted is capable of utilizing at least an additional 300 tons per day of processed RDF.

#### 4.1.3 Concept

The proposed facility will be capable of processing 50 tons of MSW per hour. The waste will be processed in a single processing line over one shift of 10 hours. An approximate maximum of 500 tons per day of MSW processed at the facility will be generated in Anoka County. (Anoka County has contracted to provide a minimum of 350 TPD.)

Waste may also be received under contract arrangements from other Counties in Central Minnesota. Depending upon the volume of MSW received from areas outside Anoka County, additional processing capacity will be provided, (up to three processing lines) or additional operating shifts will be scheduled. Alternative scales of the project are discussed in Section 4.2.

MSW received at the facility will be inspected on the tipping floor and unprocessable waste will be removed. This reject fraction

will consist of bulky objects such as bed springs, carpet rolls, large automotive parts, appliances and other obviously unprocessable materials. In addition, potentially hazardous materials such as propane bottles, gasoline cans, and non-household quantities of hazardous waste will be rejected. The remaining MSW will be subjected to a series of size reduction and separation processes which classify the waste into a light combustible fraction (RDF), a heavy fraction (RDF residuals) and recovered recyclables such as aluminum and ferrous metals. If feasible, additional processes (glass recovery and heavy fraction co-composting) will be implemented to further reduce the volume of residue requiring deposition in landfills. A specific time frame for the development of such processing has yet to be determined.

Ash from combustion of the RDF in the power station will also constitute a residual which will require disposal or treatment at an appropriately permitted facility.

#### 4.1.4 The RDF Facility

The facility will provide for municipal solid waste (MSW) receiving, storage and processing. The receiving and storage portion will have capacity for 3,000 tons of MSW, 300 tons of RDF storage in trailers, a three-day accumulation of ferrous and aluminum metals, and other residue. Solid waste, other than metals, will generally not be stored overnight at the facility. Waste that exceeds processing capacity can be compacted for transport to landfills or other processing facilities. In addition to the receiving and processing buildings, the facility complex will include a scale/guard house, and an administration building. A refuse disposal area where solid waste delivered by citizens will be deposited in open-top trailers will be provided. Figure 4-2 shows site plan information for a generalized 500 tpd facility.

The RDF process will feature the type of equipment now operating at Baltimore County, Maryland. This facility was designed and is operated by National Ecology. The facility will have one, two or three processing lines each rated to handle 50 tons per hour. A 10-hour processing schedule will achieve the 500 tons per day per line minimum processing under normal conditions.

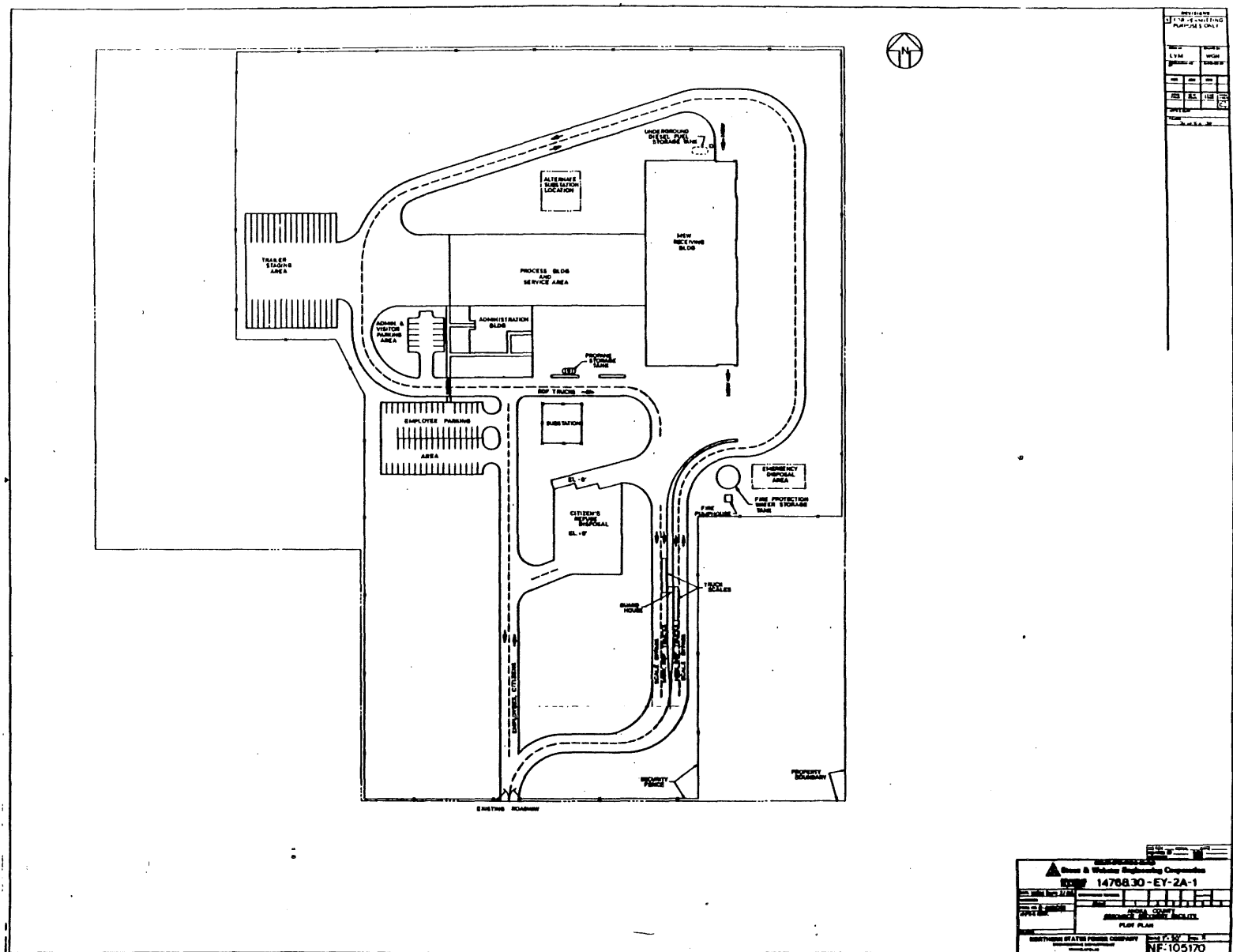


Figure 4-2 Site Plan

#### 4.1.5 Facility Operations

Figure 4-3 is a schematic diagram of the proposed processing facility. Solid waste received at the facility will be deposited on a tipping floor in the receiving building. Initial sorting for unprocessable material will occur at this point. Waste will be placed by a front-end loader onto pit-installed conveyors. Additional unprocessable material will be removed by a grapple crane.

This design utilizes the concept of primary size reduction by flail mills, general sizing by disc screens, removal of specific recyclable items such as ferrous and aluminum by magnetic and manual sorting procedures, and density separation in air knives. Most high combustible material of a variety of sizes will be converted to RDF.

The MSW will be shredded in a flail mill and liberated from plastic bags or other containment devices. The refuse will be magnetically processed for recovery of ferrous metals. MSW tends to fall into size ranges with the following characteristics:

- Glass, stones, ceramics, dirt, and other ash forming components -2"
- Ferrous and aluminum can stock 2"-4"
- "Heavy" ferrous and non-ferrous metals +4"
- Combustibles (paper, cardboard and plastics) +4"

The natural separation sizes are, therefore, 4" and 2".

Ferrous metals will then be removed by magnetic separators, cleaned of loose contaminants by an air classifier and conveyed for loadout to a small holding bin. The non-ferrous section will be routed to a primary disc screen. Self-cleaning, agitating disc screens will separate materials with dimensions less than four inches and further separate the smaller materials with a two-inch screen. The oversize material from the primary disc screen (+4") will be directed to an air density separator which will remove the heavy fraction by a primary air knife. The heavy portion will be directed to a stationary compactor while the light fraction from the separator will be directed to the secondary shredder for final size reduction and RDF product loadout.



The undersize material from the primary disc screen will be directed to the secondary disc screen. The oversize material that does not pass through this screen will be processed through an air knife and becomes RDF (except for aluminum cans that are concentrated and manually removed). The undersize material from the secondary disc screen will be further processed by another air knife. The light fraction will be recombined with the main waste stream while the heavy fraction will be compacted as residue for landfilling or further treatment by composting.

System control will follow a run/no-run philosophy in which all upstream unit operations are governed by the availability of downstream unit operations. Thus, operation can be discontinued at any time. Normally operations will be directed from the central control room, but local operator control is an option.

Dust control will be accomplished by close containment of all transfer points and aspiration wherever dust generation impact is anticipated. Various semi-airborne light fractions will be settled out onto belts and within tube conveyors and dust generated will be aspirated to a baghouse.

The tipping floor will be on grade and contained by push-walls. It will have capacity to store 3000 tons of MSW. Additional space for residue storage will be in the receiving building on the tipping floor. Some limited sorting will take place on the tipping floor where the equipment operator will remove and set aside obvious salvage and items that cannot be processed.

The final RDF stream will consist of a composite of material from the shear shredders (if installed), oversize material from the secondary disc screens (picked free of aluminum) and light combustible material separated by the secondary air knives. The RDF stream will be outloaded through one of two compactors to semi-trailers for transportation to the power plant. It may be necessary to transfer part of the MSW without processing it into RDF at the facility. This waste would either be landfilled or processed elsewhere. Transfer without processing will only be necessary if the MSW delivered to the plant exceeds processing and storage capacity. Figure 4-3 shows a generalized process diagram.

#### 4.1.6 Utilities

Approximately eight acres of land surface will become impervious through construction of the project. Drainage from these surfaces will be routed through oil and debris traps prior to discharge to the existing surface water drainage system. This system includes wetlands which both attenuate the peak runoff rates as well as serve as a recharge area. Sanitary wastewater will be generated by employees and visitors, and is expected to be less than 1000 gallons/day. These wastes will be treated in an on-site system consisting of a septic tank and soil absorption system. Process wastewater consisting of tipping floor washdown will be collected, placed in holding tanks, and periodically hauled by truck to the City of Elk River Wastewater Treatment Plant. Depending on the strength of the washdown water, on-site treatment may be proposed at a later date. Such a treatment facility would be subject to review and approval by MPCA staff. Electric power would be obtained by accessing the existing utility infrastructure.

#### 4.1.7 Hazardous Materials

Minnesota hazardous waste rules prohibit commercial and industrial disposal of hazardous waste within solid waste destined for transport to a municipal landfill or RDF facility. Hazardous waste may nevertheless be delivered to the processing plant. Several provisions have been made to screen and separate non-household hazardous waste from the solid waste stream. Incoming material will be dumped on the tipping floor and inspected before the hauler leaves the facility. Any hazardous or unacceptable materials will be observed by plant staff and segregated for the subsequent disposal in an appropriate facility. Haulers that service areas of higher hazardous waste generation will be screened closely. Periodic inspection of refuse vehicles will be undertaken as necessary. Any incoming load containing hazardous waste or significant amounts of unacceptable waste may be rejected.

The front end loader operator will inspect the waste and remove any hazardous materials observed. A third inspection will occur at the grapple crane located on the conveyors leading to the flail mill. At this point hazardous materials identified will be removed from the process line, stored, and transported to a regulated hazardous waste disposal facility.

Residential waste will sometimes contain small quantities of hazardous waste, despite public awareness programs concerning hazardous waste disposal. The impact of small quantities of hazardous waste such as paint solvents and pesticides from households historically has not been a major concern in RDF processing. The material becomes incorporated into the RDF and is destroyed by combustion.

#### 4.1.8 Disposal of Residuals and Ash

Residuals (the heavy fraction) from the RDF process will amount to about 24 percent of the solid waste infeed. These residuals will be disposed of in an approved mixed municipal solid waste disposal facility. Ash resulting from combustion of the RDF will be approximately 10 percent by weight of the actual RDF burned and will also be landfilled in an approved facility, unless alternative uses for ash can be developed. Ash will likely be deposited in a specially constructed portion of the sanitary landfill, provided with a liner and leachate collection system. The significance of residuals to local and regional landfills are discussed in Section 5.3 of this EIS. For the proposed facility, the operators of the combustion facility are responsible for ash disposal. The County (or counties participating) will be responsible for disposal of the heavy fraction residuals, and unacceptable wastes.

#### 4.1.9 Schedule and Costs

Construction is scheduled to begin in the fall of 1986. The facility is expected to be completed by the fall of 1988 and begin its first full year of operation in 1989. Construction cost is estimated

at \$14 million and the annual operating budget is projected at \$8.7 million for the 500 tpd facility. Figure 4-4 depicts the likely construction schedule for the proposed facility.

#### 4.1.10 UPA Power Plant

The existing UPA power plant is located on U.S. Route 10 approximately one-quarter mile north of the intersection of State Route 101 and U.S. Route 10. The power plant consists of three boiler units. Units I and II are each capable of firing about 350 tons of refuse derived fuel upon conversion. Unit III will be capable of burning at least 350 tons of RDF daily. UPA anticipates that it will be able to utilize in units I and II a minimum of 350 tons/day of RDF at any given time. On most given days, Units I and II will fire at a rate of 700 tons/day. However, annual downtime for each of the units could be as high as 30%. This anticipated downtime reflects an annual planned shutdown of 4-6 weeks for maintenance, and overnight shutdowns scheduled every two weeks and lasting for one or two shifts for inspection. Planned downtime will be scheduled so that at least one unit is operating at any given time. Unscheduled downtime cannot be anticipated. In terms of annual utilization rates, Units I and II will be able to utilize 180,000 tons of RDF annually. The 70% availability will also apply to Unit III, if that boiler were to be converted. Unit III is expected to be capable of utilizing RDF at a daily rate of 350 tons.

The three boilers were originally designed to generate about 45 megawatts of electricity (net). Certain adjustments will be required to convert the units to fire solid waste. These changes are outlined as follows:

- Installation of a new chain grate stoker to minimize the risk of jamming from inconsistent RDF.
- Installation of a larger overfire air fan for more complete combustion.

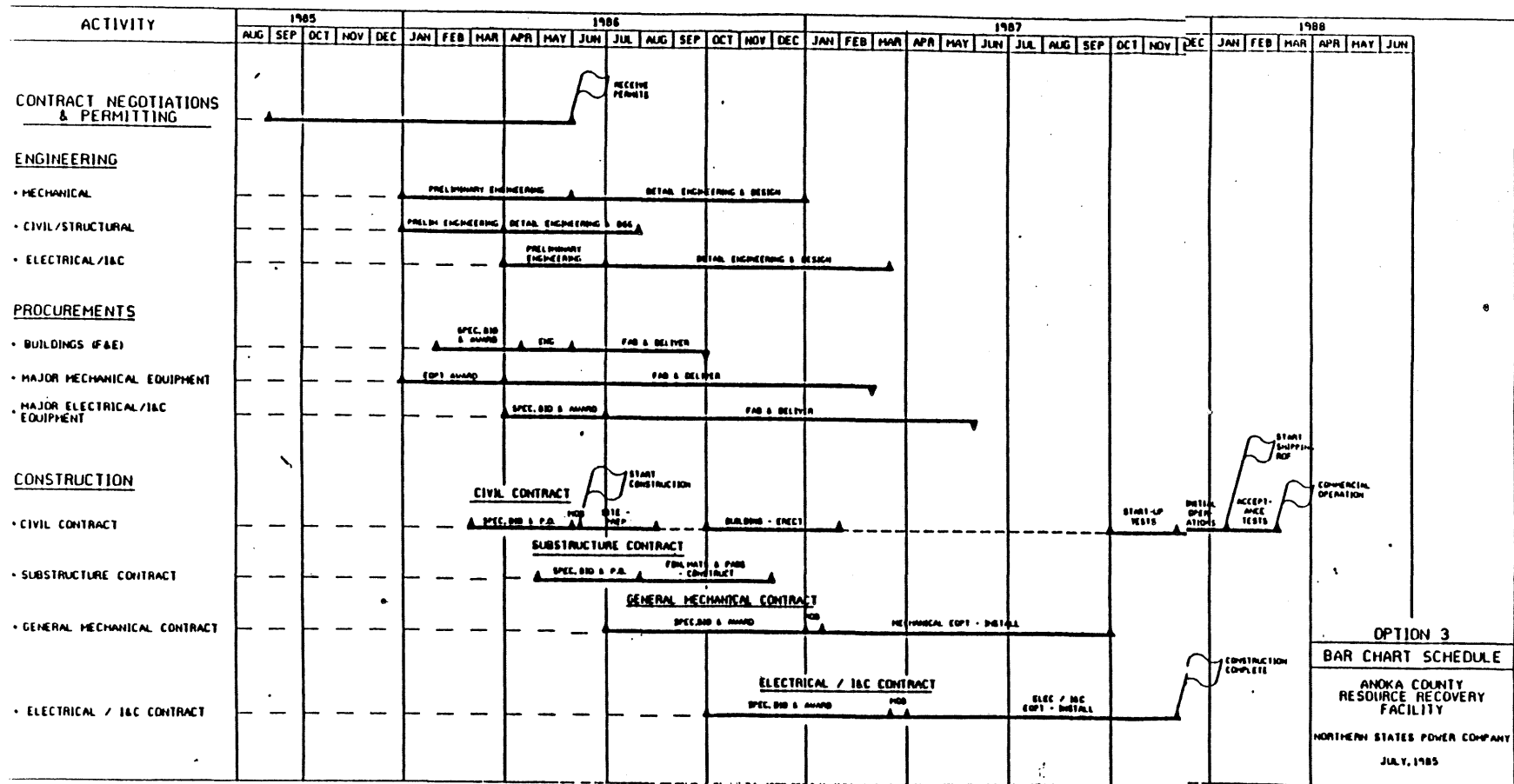


Figure 4-4 Schedule

Source: Springsted, Inc. March 86

- Removing existing refractory, lowering the grate level in the furnace, and adding waterwalls to increase furnace volume and heat transfer surface in order to reduce the furnace exit gas temperature to 1600°F.
- Installation of a multiclone dust collector downstream of the economizer to protect the baghouse from burning cinders and the ID fans from excessive wear.
- Providing a 1000 ton RDF receiving and storage facility complete with transfer conveyors, surge bins, and environmental controls including dust collection, ventilation, and fire protection.
- Providing a new bottom ash handling system consisting of a dry drag chain and modifications to the existing vacuum pneumatic boiler backpass and baghouse flyash collection systems.
- Modifying the existing baghouse for a new bag suspension system and new acid-resistant bags and door gasketing.
- Providing a new distributed control system for the boiler plant and material handling systems.
- Providing electrical distribution required for new equipment and utilizing existing auxiliary capacity to handle the conversion.
- providing new ID Fans.

The gases currently emitted from the plant's three boilers are jointly exhausted through a recently installed Research-Cottrell, Inc. baghouse. The baghouse was recently tested in July of 1978 and reported at a 99.4 percent efficiency (MMT Report No.8135, August 18, 1978). The existing facility generates electricity on an intermittent basis.

The UPA Elk River power station has generated electricity in the past by combusting coal, oil, shredded tires, and natural gas. In addition, a nuclear reactor was utilized on this site. The facility takes water from the Mississippi River, permitted at a withdrawal rate of 25,000 gallons per minute (gpm), and one on-site well, permitted at a withdrawal rate of 200 gpm. According to the 1984 Water

Appropriation Permit report filed with the Minnesota Department of Natural Resources, the facility used an average of 126,600 gallons per day (gpd) and 17,300 gpd from the two water sources, respectively. The primary water use is for once-through cooling in turbine exhaust condensers. Additional water is used for boiler make-up, plant washdowns, and air conditioning. Wastewaters generated from boiler blowdown, in-plant washings, and the demineralizers are treated in a settling clarifier. According to the facility National Pollution Discharge Elimination System (NPDES) permit the process discharge from the clarifier is monitored prior to combining with non-contact cooling and air conditioning water for flow, pH, turbidity, suspended solids, oil and grease, copper and iron. The final combined discharge to the Mississippi River is monitored for flow, chlorine residual, and temperature.

#### 4.2 Alternative Project Sizes

##### 4.2.1 1000 Tons per Day Facility

As indicated in Section 4.1, the volume of incoming MSW to be processed at the proposed Elk River RDF facility has not been conclusively determined. NSP has submitted a permit application for review by the MPCA Staff, for a resource recovery facility which will receive an annual average input tonnage of as much as 1526 tons/day capacity. A permitted annual average input tonnage of 1526 tons/day is equivalent to a daily input of 1780 tons, based upon a six-day week. Past experience suggests that a maximum daily input could be as high as 2300 tons, but this occurrence would be quite atypical. The application also contains the proviso for downscaling the permitted tonnage, depending upon results of negotiations with interested counties. Ultimately, the size and configuration of the facility will be determined by the contracted volume of waste input and operational considerations such as equipment reliability and maintenance requirements.

Three alternative plant configurations are being considered. They consist of, respectively, a one-line, two-line, and three-line

processing facility. Each line would process MSW at a rate of 50 tons/hour. The daily input capacity of the facilities, when operated for one shift of ten hour's duration, would be 500, 1000, and 1500 tons per day, respectively. Assuming an RDF recovery rate of 70%, RDF outputs would be 350, 700, and 1050 tons per day, respectively. If an alternative shift schedule of two shifts of eight-hours' duration is implemented, inputs could increase to 800, 1600, and 2400 tons per day, and outputs to 560, 1120, and 1680 tons per day, respectively. Fluctuation in volume resulting in inputs above these capacities would be accommodated by temporary storage of the excess within the facility, by temporarily extending operation hours, or by accelerating the rate of operations.

The EIS Scoping Decision, adopted by the MPCA Board on February 11, 1986, mandated the evaluation, in the EIS, of impacts associated with operation of the facility at 500, 1000, 1600 and 2400 tons per day. As a refinement of the scope, the EIS will include an evaluation of the site-related impacts of construction and operation (water quality, noise) of the following configurations:

- the one-line facility
- the two-line facility
- the three-line facility

The evaluation of off-site impacts (landfill utilization and transportation) will be based on the following rates of production.

- 500 tons per day
- 1000 tons per day
- 1500 tons per day (equivalent to 1526 and 1600 tons per day)
- 2400 tons per day

Air quality impacts were evaluated on the following basis. Criteria air pollutant concentrations were modeled under the following scenarios:

- Unit I or II firing RDF
- Unit I and II firing RDF
- Units I, II and III firing RDF
- Unit III alone firing coal, (worst-case).

Impacts were modeled for varying periods of historic worst-case meteorological conditions. As such, the worst case scenario is used to represent all rates of production at the RDF facility. For non-criteria pollutants the worst case scenario is assumed to be all units firing RDF.

Contractual arrangements will be necessary with other sources of solid waste for all alternative production rates other than 500 tons/day. Under certain circumstances (scheduled and unscheduled downtime) it is likely that at least some of the RDF produced will be transported to other facilities for combustion. Utilization at other sites is a possibility given alternative configurations and production rates. For the larger alternative production volumes, this utilization at other facilities is certain. The permitted annual volume of the 1500 ton per-day RDF facility is equivalent to roughly 390,000 of RDF annually. This compares to an estimated 180,000 tons/year of annual capacity in Elk River Units I and II.

It is noted that both Anoka County and NSP have indicated that production at an average annual tonnage rate of 2400 input tons per day is unlikely, since that amount of municipal solid waste is simply not available in the service area.

#### 4.3 Alternative Technologies

##### 4.3.1 Introduction

Central to the solid waste management strategy of Anoka County and the Metropolitan area is a policy mandating termination of the landfilling of unprocessed mixed municipal solid waste after 1990. Landfill abatement may be achieved by employing a combination of decentralized low technology methods as well as more centralized, often higher technology methods. The former include waste reduction

and source separation/recycling. They are considered low technology because they would require only a small capital investment, have the flexibility to respond to change, and involve the participation of those that generate the waste. These methods may not be capable of attracting sufficient immediate participation to achieve the same level of abatement as centralized high technology methods, but instead can complement centralized processing methods. Centralized processing resource recovery methods include mass burn, refuse-derived fuel systems, and co-composting. Centralized processing is generally referred to as a high technology approach because it uses more expensive equipment and facilities. Operating costs are typically higher, and long-term financing and commitments for waste supply are typically required. Whereas mass burn and RDF systems now represent the most prominent landfill abatement techniques (volume reduction achieved by these methods is typically on the order of 50-70 percent), the potential contribution of co-composting towards landfill abatement is undetermined. The following paragraphs provide an overview of these technologies. Additional alternative resource recovery systems such as pyrolysis have been employed on a limited basis; these will not be addressed in this alternatives analysis, since they are not considered commercially available or feasible.

#### 4.3.2 Low Technology

##### Waste Reduction

Waste reduction methods are those which reduce or prevent the generation of wastes and/or keep wastes out of the collection and disposal system. Waste reduction methods include, but are not limited to:

- container deposits
- packaging recycling
- product changes
- improvements to industrial manufacturing processes
- product bans/prohibition

- conservation
- office paper reduction
- backyard composting.

Some of these methods and their implications are briefly enumerated below.

An effective public education campaign is considered a necessary ingredient for a successful reduction program. People may alter their buying habits to avoid purchasing wasteful products such as single serving containers and throw-away items. Consumer preferences for less packaging, recycled materials, and more durable goods are indicative of both a cost-conscious and waste-conscious public.

It is estimated that office paper reduction could diminish paper consumption by 4.5 percent annually, which corresponds to about a two percent reduction in solid waste. Such reduction may be achieved by using both sides of office paper, increased use of microfiche, and changing formats. Waste reduction is an ongoing consideration of Anoka County offices. Waste reduction programs which may be pursued by government units also include establishing policies for buying and using products which are more durable. Procurement policies could give greater consideration to total costs over a product's life.

Certain waste reduction activities such as container deposits, product bans, and packaging reduction require legislative action or actions taken beyond the local level. A container deposit could result in an appreciable reduction in the solid waste stream. National estimates indicate that container deposit legislation could reduce the solid waste stream by an average of two to four percent. A full scale waste reduction effort may require new federal or state legislation. Such legislation may require years to pass, and might only occur after the full economic benefits and costs are known.

An additional waste reduction action includes mulching and composting of residential yard and garden wastes such as grass clippings and leaves where they are generated. Wide-scale backyard mulching and composting would entail dissemination of instructions about these processes to waste generators. The Metropolitan Council has estimated that with well-designed and financed publicity programs,

voluntary participation in mulching and backyard composting could reach thirty percent. However, MPCA staff have indicated that a voluntary waste reduction and public education program could be expected to result in less than a 1% reduction in the solid waste stream, and the Metropolitan Council estimate is therefore considered a goal.

Similarly, the Metropolitan Council has proposed a regional strategy that includes consumer education and awareness, office paper re-use, yard waste mulching, and government purchasing practices involving reduction. The Council's estimates are that waste reduction methods could account for a few percentage points reduction in the solid waste otherwise entering the waste stream.

#### Source Separation/Recycling

Waste source separation methods involve the separation of recyclable or compostable waste, so that such materials do not enter the mixed municipal waste collection and disposal stream. Programs for recovery of materials through recycling are dependent upon source separation by waste generators. Separation is followed by processing and transporting the recyclables to manufacturers or other raw material users for reuse.

Source separation programs not only conserve resources and reduce disposal requirements, they also facilitate the resource recovery process by removing certain unprocessables from the waste stream. Typical recyclable items are as follows:

- Paper and Paper Products. This represents the largest fraction of municipal solid waste. Most recycled paper comes from homogeneous sources, since it is costly to salvage paper from mixed MSW. Clean newsprint and corrugated paperboard possess the most potential for waste paper recovery. EPA studies indicate that general office facilities generate an average of 1.55 pounds of waste per employee per day, of which 1.32 pounds is recoverable paper.

- Glass. Glass represents 10 percent of MSW nationally. Uses for reclaimed glass range from reuse as containers and flat glass to use as an aggregate in asphalt pavements.
- Cans. Aluminum cans have the greatest recycling potential of all non-ferrous metals found within MSW.
- Yard Wastes. Yard waste represents approximately seventeen percent by volume of the total waste stream of Anoka County, and is subject to wide seasonal variation. Yard waste is composed of leaves, grass clippings, weeds and twigs. Yard waste may be used as compost, a nutrient and carbon rich material that forms a beneficial growing environment for plants. Composting of yard waste is a proven method of processing organic residuals into a beneficial soil amendment.
- Salvaging. Various other materials, i.e. tires, may be hand picked and removed from the waste stream. Tires are a major source of rubber in municipal solid waste. Reprocessed rubber is used in the manufacture of new tires.

On a national average, municipal wastes include the following levels of secondary materials (U.S. EPA Solid Waste Data):

| <u>Material</u>        | <u>Percent of Municipal Waste</u> |
|------------------------|-----------------------------------|
| Newspaper              | 5                                 |
| Glass Containers       | 10                                |
| Steel Cans             | 3                                 |
| Aluminum Cans and Foil | 1                                 |
| Corrugated Cartons     | 7                                 |
| Plastic Wastes         | 2                                 |
| Yard Wastes            | 19                                |
| Office Paper           | <u>3</u>                          |
|                        | 50                                |

In Hennepin County, these secondary materials equaled about 40 percent of the total waste flow. (Source: Hennepin County Recycling Study, Volume III).

Major factors which affect recycling programs are :

- Characteristics of the collection system.
- Location and size of markets for recycled materials.
- Public awareness.
- Cost of the recovery process.
- Cost of other disposal methods.
- Government policies.
- End uses of recycled materials.

Recycling and source separation are decentralized and rely heavily on the participation of the individual generator. Drop-off centers are the most common type of recycling operation and are widespread throughout the Twin Cities Metropolitan Area. Curbside collection recycling programs are practiced less frequently, and are often limited to handling only newspapers. Curbside collection is more feasible in more densely populated urban and suburban areas whereas drop-off centers are more likely to be employed in less populous areas,

Three common varieties of curbside collection systems include separate collection of one material, collection of newspaper and refuse, and collection of five or more recyclables. Methods for collection of yard waste include: Voluntary drop-off, separate bagging and drop-off by refuse haulers, separate collection by the municipality refuse hauler, and residents raking leaves into the street on assigned days and collection by the municipality.

Surveys estimate that anywhere from a few percent to up to 20 to 30 percent of a local community may use a drop-off center (Diaz et al, 1982, Barton, 1979). Participation is, however, difficult to determine since records of participants are not usually kept by recycling centers. Public participation at drop-off centers is generally not as high as curbside collection given the greater effort required on the part of the individual generators.

Recycling efforts are usually voluntary. Some communities throughout the nation have now adopted ordinances mandating that certain materials be separated from household trash and be designated

for recycling. An EPA study that investigated the effect of mandatory ordinances on participation found that participation rates in mandatory programs are slightly higher than those in voluntary programs. A survey of public attitudes in the Metropolitan region indicated that residents would participate in source separation programs if curbside pickup were offered for free or at a small monthly charge

Solid waste cannot be considered recycled until it is reused by consumers. Major obstacles to implementing source separation in the past have been economic, since separation programs have not been able to compete with the artificially low costs of land disposal. Recycling markets may fluctuate, and recovered materials may vary with time and location in price, quality, and availability of supply. Secondary materials markets that use glass, metal, and paper exist in the region.

Cost data on recycling is not conclusive given that there are a large number of factors which affect cost, i.e., curbside or drop-off collection and market availability. The following cost information was provided in the Hennepin County Recycling study:

- 1) Expenses for a drop-off center are almost entirely due to labor with a smaller portion of costs attributed to handling and transportation. For a small drop-off center handling one material, costs are likely to be 5 dollars per ton. For a drop-off center handling five or more items, costs may be up to \$35-40 per ton.
- 2) Curbside collection operational costs also exceed the revenue generated. Because curbside collection is labor intensive, higher costs are associated with this method than other options. However, curbside recycling is cost-effective if the full cost of waste collection and disposal are credited to the program.

The Anoka County Waste Designation Plan estimates that an integrated recycling program (consisting of drop-off centers, buy-back centers, and curbside collection) can realistically recover anywhere

from three to sixteen percent of solid waste. More specifically, assuming a high citizen participation rate of 50 percent for areas serviced by a curbside collection program (approximately 73 percent of the County's population) and a 4 percent participation rate for the area serviced by a drop-off program, the plan estimated that source separation could divert 5 to 6 percent from landfills, and yard waste composting an additional 4 to 5 percent. The Metropolitan Council has estimated that as much as 15 percent of the total solid waste generated annually could be separated and recovered under a full scale recycling effort.

#### 4.3.3 Centralized Processing

##### Mass Burn

In this technology, the waste-to-energy system accomplishes both volume reduction of refuse and the use of generated heat to produce steam and/or electricity. Mass burn systems have been employed widely in western Europe within the last thirty years, and are the most widespread solid waste resource recovery systems in the United States and Europe. In mass burn systems, waste may be incinerated without preparation or separation except for removal of oversized or hazardous materials. Source separation and back end processing are sometimes integrated into these operations to recover selected materials that have market value. Most commonly employed is magnetic separation, which is used to recover ferrous metal from solid waste as it is processed. Recovered iron is sent to a metal recovery facility.

In mass burn systems, waste from the tipping floor or storage pit is loaded by overhead crane or front end loader into the combustion charging unit. The refuse is combusted as it is conveyed through the furnace. The heat is recovered in a boiler and used to generate energy. There are basically two types of mass burn systems, waterwall boiler and modular incinerators.

Based on the cost data provided by seven mass burn proposers to Anoka County, capital costs estimates for a 500 tpd facility ranged from 30,950,000 to 59,798,000 dollars, and capital costs for a 1000

tpd mass burn plant ranged from 65,150,000 to 75,050,000 dollars. Based on the operation and maintenance costs, the debt service (assuming 8 percent interest), owners equity return, and the energy credit per ton projected for each proposer, the net fee was calculated by Springstead Incorporated (the County's financial consultant). These were as follows:

| <u>Facility</u>             | <u>Wet Tipping Fee (\$ per ton)</u> |
|-----------------------------|-------------------------------------|
| 400 tons per day mass burn  | 34.76 - 79.50                       |
| 1000 tons per day mass burn | 31.11 - 39.82                       |

#### WATERWALL

Waterwall boilers use a reciprocating grate system or reverse reciprocating grate system that advances the MSW along stepped grates. The boiler is an array of water filled tubes which enclose the furnace and comprise the boiler itself. Water circulates through the tubes to recover the heat radiated by the burning fuel. Combustion air enters the furnace both above and below the fuel bed. Combustion conditions are precisely controlled by both manual and automatic controls. The combustion reaction occurs in an excess air atmosphere which serves to maximize burnout and assure complete combustion of MSW. Thermal efficiency estimates vary, but are within the range of 60-75 percent. The waterwall is reliable and can accommodate MSW of various compositions and heating value. Initial costs for waterwall systems are generally higher than those for modular incinerators.

#### MODULAR INCINERATORS

Mass burning modular incinerators are constructed in modular arrangements with multiple units combining to provide the desired capacity. The modular incinerator technology begins with starved air combustion in the reducing atmosphere of the primary chamber. This

refractory-lined furnace contains the refuse fuel, which is typically advanced by a hydraulic ram. From the primary chamber, the hot flue gases advance to the secondary chamber, also refractory lined, where the auxiliary fuel and excess combustion air combine in an oxidizing atmosphere. A heat recovery boiler will collect the steam. The modular incinerator can accommodate air pollution control equipment. The advantages of modular incinerators include their lower initial cost, more rapid construction schedules and ability to serve communities too small to be accommodated by the more efficient waterwall systems. The disadvantages of the modular incinerators, compared to waterwall boilers, include their relatively shorter operational life, reduced reliability, inferior energy recovery efficiency and the lack of experience generating turbine grade steam to produce electricity.

Mass burn concerns include: fugitive dust, ash, odors, noise, residue (fines, unburned combustibles, metal, glass/rock), microorganisms (aerosols), organic compounds (flammable gases and vapors, and pesticides), and occupational health considerations. The primary consideration is air pollution, but control technologies such as scrubbers, electrostatic precipitators and fabrics filter are generally installed to minimize air emissions.

#### Refuse Derived Fuels

Refuse derived fuel systems represent another central processing energy recovery system. In refuse derived fuel systems, combustible material is separated from non-combustible material for burning. RDF is the product derived from the mechanical processing of the MSW.

In the RDF technology, municipal solid waste is typically first sorted to separate out non-combustibles and then shredded to near-uniform particle size before being introduced into a high-velocity column of air (air classification) to "blow-off" the light, material. The product of this process is RDF. This technology can be used in many combinations to process waste and it is, therefore, possible to produce RDF fuel in several forms. The heavy, primarily inorganic, fraction can be channeled through a series of

separation processes to sort out iron, as well as aluminum and glass. Depending on the particular system and the desired separation, such processing can include secondary shredders, screens, magnetic separators (ferrous metals), eddy current separators or "aluminum magnets" (aluminum), froth flotation units and optical sorters (glass).

The marketable materials fraction is cleaned and sold (when markets are available), while the fuel portion is burned in either a dedicated boiler or burned in a specially modified utility boiler. Steam or electricity is produced from the fuel portion of RDF. Experience to date reveals that over 80 percent of the RDF facilities product revenue comes from the sale of the fuel, not the sale of recyclables.

RDF systems have a greater ability to recover resources and thus can result in less residues than mass burn systems especially if the heavy fraction is co-composed. RDF systems do, however, require more complex equipment than mass burn, and operating experience has revealed reduced reliability associated with this additional equipment. There have been instances of explosions associated with the use of shredders. However, these problems are possible to overcome. RDF facilities tend to produce dust. A comparison of RDF and mass burn is presented in Table 4.4-1.

Based on the cost data provided to Anoka County by three RDF proposers, capital cost estimates for a 400 ton per day RDF facility ranged from 8,800,000 dollars to 39,950,000 dollars. Capital costs for a 1000 tpd facility were estimated to range from 10,700,000 to 97,200,000 dollars. Based on the projected operation and maintenance costs, the debt service (assuming 8% interest), owner's equity return, and the energy credit per ton projected for each proposer, the net fees calculated by Springstead Incorporated were as follows:

| <u>Facility</u>   | <u>Wet Tipping Fee (\$ per ton)</u> |
|-------------------|-------------------------------------|
| 400 tpd facility  | 17.67 - 61.89                       |
| 1000 tpd facility | 10.28 - 65.00                       |

TABLE 4.4-1  
RDF VERSUS MASS-BURN: A TECHNICAL COMPARISON

| <u>Technical Aspect</u>   | <u>RDF System</u>                                                  | <u>Mass-Burn System</u>                        |
|---------------------------|--------------------------------------------------------------------|------------------------------------------------|
| Operating Experience      | fewer operating facilities, shorter operating time                 | many operating facilities, long operating time |
| Reliability               | acceptable with proper design and operational control              | acceptable                                     |
| Materials Recovery        | greater variety, higher value                                      | limited to ferrous metals                      |
| Siting Flexibility        | split-siting possible                                              | single site only, less land required           |
| Energy Market Flexibility | steam, electricity<br>RDF, compost, glass sales                    | steam and/or electricity                       |
| Technological Flexibility | adjustments and incorporation of new separation equipment possible | will accept a wide variety of waste            |

Source: Anoka County, April 1985

## Co-Composting

Co-composting is a method of managing solid waste and any suitable nitrogen source. Municipal co-composting systems typically operate in five sequential steps: preparation, digestion, curing, finishing or upgrading and storing. Co-composting is the decomposition of organic solid wastes to a relatively stable humus-like material. Decomposition is accomplished by various micro-organisms including Bacteria, actinomycetes and fungi. The by-products of aerobic decomposition are principally carbon dioxide, water and heat.

The various composting technologies are windrow pile, aerated static pile and mechanical systems. Mechanical composting systems include those processes which use automated equipment for turning and aerating the compost during the digestion phase. This includes rotating digesters, circular tank-rotating arm digesters and multideck digesters which mechanically pass the compost system between deck-serrated static pile systems. Aerated static pile systems involve placement of material over air jets that introduce oxygen to accelerate decomposition of the wastes. Windrow pile systems include those processes which involve piling material in rows with periodic turning by front-end loaders or manually for smaller scale systems.

In most modern co-composting, the aerobic process is used rather than the anaerobic. There are three major reasons for this: time of process, temperature and odor problems. Aerobic decomposition with microorganisms requires free oxygen to decompose the waste. The speed of decomposition is oxygen dependent. Too little oxygen and the process may either slow down or become anaerobic. Thus, in forced digestion systems, oxygen must be introduced by force draft or agitation.

In the aerobic systems, the temperature reaches 60° to 70°C or higher. This level of heat in the processing and finishing destroys pathogenic organisms, weed seeds and fly ova. With the anaerobic systems, temperatures are only about 38° to 55°C and pathogens may survive. Also, anaerobic decomposition produces objectionable odors. In aerobic decomposition, the process progresses

rapidly without excessively unpleasant odors. The major odor and pest problems in the windrow method are either from cooler outer regions or pockets of the windrow where the oxygen has been exhausted and anaerobic decomposition is taking place.

To produce a high quality product, co-composting of sludge with mixed MSW requires a great deal of screening both before composting and after curing to eliminate undesirable inputs such as plastic. Mixed MSW must be shredded and processed before mixing waste with sludge for composting. Different degrees of MSW processing result in compost of varying qualities.

A major factor determining the feasibility of large scale co-composting is marketability or use for the product. A conclusion of the Metro Council, in its 1984 report The Potential for Large-Scale Sewage Sludge Composting and Co-Composting in the Metropolitan Area was that co-composting could not be adequately evaluated at that time because there was insufficient information on the potential quality of the product and its marketability. A major study with the following key elements was recommended by Dr. Eliot Epstein of E & A Environmental Consultants in a 1985 presentation to the Council:

- evaluation of potential uses of compost;
- determination of regulatory constraints;
- detailed market analysis;
- facility design consideration as related to market demand;
- design of product marketing scheme.

An additional report Potential Users for Compost in Minnesota by the MPCA presents promising prospects for co-composting marketability. Both MPCA and Epstein cite a marketing strategy by the Washington Metropolitan Council which in 1984 was successful in distributing all the compost produced (in excess of 100,000 cubic yards of material). Approximately 15 buyers were initially identified in the Washington Metropolitan Area, including government agencies; parks, nature and forest preserves; turf farms; citizens, and agricultural activities. Similar markets are projected to exist in Minnesota, including mine restoration, other crude markets (parks,

recreation areas and the home building industry) and refined markets (nurseries, flower growers, golf courses, and turf growers).

The infrastructure may be in existence in the metropolitan area to facilitate the land application of compost or compost-like material. Agronomic rates for compost application may be as much as 4 to 5 tons per acre (MPCA, 1986). A market may exist with the various farms located in northern Anoka County. Additionally, the area in the vicinity of Elk River is characterized by very sandy soil, which might benefit from compost application.

#### 4.4 No-Action Alternative (Anoka County Only)

If the proposed action or any of the defined alternatives is not implemented it is assumed that the present practice of landfill disposal of solid wastes will continue. Currently approximately 500 tons per day of municipal mixed waste generated in Anoka County is disposed of at various landfills.

By state statute, municipal waste could not be directly landfilled in Metropolitan Area landfills after January 1, 1990. (Amendment to Waste Management Act in 1985). In addition, the regional landfill system is estimated to have capacity only until 1991-1993. If no alternative to the landfilling of waste were available by 1990, the state statute would be violated. Therefore, the no action alternative would result in a violation of current state law or the disposal of waste in landfills located outside the metropolitan area. Either the proposed action or a reasonable alternative to it must be in place by 1990.

#### 4.5 No-Burn Alternative

Any solid waste disposal alternative based on a no-burn/no-bury concept would likely consist of a system of disposal, source separation, recycling, and waste reduction strategies. Recycling, source separation, and waste reduction are discussed separately.

Typical disposal alternatives might involve co-composting, with or without a resource recovery component. Such facilities are still

considered experimental in the United States, but an existing permitted facility in St. Cloud, Minnesota, provides instructive experience. The following information about its operation was extracted from "Proposal for Solid Waste Scenarios to the Tri-County Solid Waste Management Commission" Bio Clean, Inc. Feb. 1986.

The facility is permitted for 100 tons per day of MSW input. Typically, 8 tons of sewage sludge or manure is added for the nitrogen source. Twenty tons of paper are removed at the front end for processing into fuel pellets, and 16 tons of finished compost is added as innoculent. The compost is processed in a mechanical composter which rotates slowly to provide mixing and aeration. The product is coarse-screened cured and fine-screened. The coarse-screenings are magnetically separated. Outputs are as follows:

|                                  |                      |
|----------------------------------|----------------------|
| Paper                            | 20 tons              |
| Compost                          | 56 tons              |
| Ferrous metal                    | 14 tons              |
| Coarse-screenings (non-magnetic) | 14 tons - landfilled |
| Fine-screenings                  | 12 tons - landfilled |
| Losses                           | 8 tons               |

For every 100 tons of solid waste (incoming), 26 tons of residue are landfilled.

#### 4.6 Co-Composting of the Heavy Fraction

Residuals from the RDF process are normally landfilled. Since these residuals can amount to as much as 20-25% of the incoming solid waste stream, any method which would enable their further processing could result in reduction of landfill capacity needs. Since the heavy fraction contains a substantial quantity of organic material co-composting has been proposed as a further process.

In Wilmington, Delaware (Biocycle Magazine, April 1984, page 23) a co-composting process is described. The facility accepts 208,000 tons/year (dry weight) of solid waste, which is equivalent to roughly 270,000 tons wet weight. It produces:

|                                      |         |            |
|--------------------------------------|---------|------------|
| RDF (dry                             | 103,000 | tons/year  |
| Ferrous metal                        | 18,000  | tons/year  |
| Non-ferrous metal                    | 13,999  | tons/year  |
| Sand                                 | 8,100   | tons/year  |
| Compost                              | 37,000  | tons/year  |
| Residue to landfill                  | 8,600   | tons/year  |
| Losses to atmosphere                 |         |            |
| (CO <sub>2</sub> , H <sub>2</sub> O) | 22,000  | tons/year. |

The volumes indicate the small scale of the facility, but it suggests that further opportunity is available to process RDF residual waste.

## 5. EXISTING CONDITIONS

The EIS analyzes the environment which would be affected by the proposed project. The geographic study area varies with different resources. For some resources, such as land use, the affected area would be confined to the site vicinity. For other resources, such as air, a larger regional area has been identified. Resources which would not be significantly affected by development of the proposed resource recovery facility and modification of the Elk River generation station are not discussed in detail. This chapter provides baseline descriptions of the existing environment for air, water, solid waste, transportation, noise, land use and socioeconomics.

### 5.1 Air Quality

#### 5.1.1 Regulatory Review

New stationary sources and modifications to existing sources must follow a new source permitting procedure in accordance with the requirements of the Clean Air Act. The Minnesota Pollution Control Agency (MPCA) and the U.S. Environmental Protection Agency (EPA) have promulgated air quality regulations that define ambient air quality standards, and impose design constraints on new or modified facilities, in order to achieve and maintain these ambient standards. Of these regulations, the proposed Anoka County Refuse Derived Fuel (RDF) Project may be subject to the following:

- National Ambient Air Quality Standards (NAAQS),
- Prevention of Significant Deterioration (PSD) regulations,
- Nonattainment (NA) area regulations,
- New Source Performance Standards (NSPS),
- National Emission Standards for Hazardous Air Pollutants (NESHAPs),
- MPCA Air Pollution Control Regulations.

These rules and regulations are discussed in the following paragraphs as they apply to the licensing of the proposed RDF processing facility and the conversion of the UPA boiler units.

#### 5.1.1.1 Ambient Air Quality Standards

The Clean Air Act mandated that the EPA identify pollutants which may reasonably be anticipated to endanger public health or welfare and to issue air quality criteria for them. These air quality criteria are to reflect the latest scientific information regarding all identifiable effects a pollutant may have on public health or welfare.

Subsequently, EPA promulgated regulations which set National Ambient Air Quality Standards (NAAQS) for such pollutants as sulfur dioxide ( $\text{SO}_2$ ), total suspended particulates (TSP), nitrogen dioxide ( $\text{NO}_2$ ), carbon monoxide (CO), nonmethane hydrocarbons (NMHC), photochemical oxidants and lead (Pb). Two classes of ambient air quality standards were established: (1) primary standards define levels of air quality which the EPA has judged as necessary to protect public health and (2) secondary standards define levels for protecting the public welfare, e.g., soils, vegetation, and wildlife.

The State of Minnesota has established ambient air quality standards for the criteria pollutants which are equivalent to the NAAQS with a few exceptions. Table 5.1-1 lists the state and national ambient air quality standards for the six criteria pollutants. Short-term (24-hour or less) standards allow the concentration limit to be exceeded one time per year. As can be seen from Table 5.1-1, in addition to the NAAQS, Minnesota also imposes a primary one-hour, and secondary three-hour and annual average  $\text{SO}_2$  standards along with a more restrictive one-hour average CO standard. Besides the criteria pollutant standards, Minnesota has also established ambient standards for hydrogen sulfide ( $\text{H}_2\text{S}$ ) and hydrocarbons.

Section 107 of the 1977 Clean Air Act Amendments requires EPA to publish a list of all geographic areas in compliance with the NAAQS as well as those not attaining the NAAQS. Areas not in compliance with the NAAQS are termed nonattainment. Areas meeting the NAAQS are referred to as attainment and are subject to the regulations for the

TABLE 5.1-1  
SUMMARY OF NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS)  
AND MINNESOTA STATE STANDARDS<sup>1</sup>

| Pollutant                     | Averaging Time      | NAAQS (PPM <sup>2</sup> ) |                   | Minnesota Standards (PPM <sup>2</sup> ) |                   |
|-------------------------------|---------------------|---------------------------|-------------------|-----------------------------------------|-------------------|
|                               |                     | Primary                   | Secondary         | Primary                                 | Secondary         |
| Carbon monoxide               | 8 hours             | 9                         | (same as primary) | 9                                       | (same as primary) |
|                               | 1 hour              | 35                        |                   | 30                                      |                   |
| Lead                          | Calendar quarter    | 1.5                       | 1.5               | none                                    | none              |
| Nitrogen dioxide              | Annual              | 0.05                      | (same as primary) | 0.05                                    | (same as primary) |
| Ozone <sup>3</sup>            | 1 hour              | 0.12                      | (same as primary) | 0.12                                    | (same as primary) |
| Particulate matter            | Annual <sup>4</sup> | 75                        | 60                | 75                                      | 60                |
|                               | 24 hours            | 260                       | 150               | 260                                     | 150               |
| Sulfur dioxide                | Annual              | 0.03                      | none              | 0.03                                    | 0.02              |
|                               | 24 hours            | 0.14                      | none              | 0.14                                    | (same as primary) |
|                               | 3 hours             | none                      | 0.50              | 0.50                                    | 0.35              |
|                               | 1 hour              | none                      | none              | 0.50                                    | none              |
| Hydrocarbons <sup>5</sup>     | 3 hours             | none                      | none              | 0.24                                    | (same as primary) |
| Hydrogen sulfide <sup>6</sup> | 1/2 hour            | none                      | none              | 0.05                                    | none              |
|                               | 1/2 hour            | none                      | none              | 0.03                                    | none              |

<sup>1</sup>National and Minnesota standards, other than those based on annual averages or annual geometric means, are not to be exceeded more than once a year (except where noted).

<sup>2</sup>All values in parts per million--except particulate matter and lead values, which are in micrograms per cubic meter.

<sup>3</sup>The ozone standard is attained when the expected number of days per calendar year in which the maximum hourly average concentration is above the standard is equal to or less than one.

<sup>4</sup>Determined as geometric mean. Secondary standard is a guide to achievement of other standards.

<sup>5</sup>Maximum 3-hour, between 6:00 and 9:00 A.M., corrected for methane

<sup>6</sup>The hydrogen sulfide standard of 0.05 PPM is not to be exceeded more than twice a year. the hydrogen sulfide standard of 0.03 PPM is not to be exceeded more than twice in any five consecutive days.

Source: Minnesota Air Pollution Control Rules, chapter 7005.0080, 1983; 40 CFR 50.4-50.12.

Prevention of Significant Deterioration (PSD), which limit the amount of possible deterioration in existing air quality. Areas which have insufficient data to make a determination are unclassified, but are treated as being attainment areas until proven otherwise. The designation of an area is made on a pollutant specific basis. The geographic regions established for designating the air quality status with respect to compliance with the NAAQS are known as air quality control regions (AQCR). The project area is located in Sherburne County within the Central Minnesota Interstate AQCR (#127). [Anoka County itself is within the seven county Minneapolis-St. Paul Interstate AQCR (#131).] The Sherburne County part of AQCR #127 is designated as unclassified.

#### 5.1.1.2 PSD Requirements

The owner or operator proposing a major new source, or major modification to an existing source, located in an attainment or unclassified area, must obtain a PSD permit before construction may commence. A major stationary source, as defined by the PSD regulations, is any source belonging to a list of 28 specified categories which has potential emissions of 100 tons per year (tpy) or more of any pollutant regulated under the Clean Air Act. Any source not included on the list, but which has potential emissions of 250 tpy or more of any regulated pollutant, is also considered a major stationary source. Potential to emit is based on the maximum design capacity of a source and takes into account pollution control efficiency. The proposed RDF facility is not included in the list of 28 categories. Since potential emissions of regulated pollutants from the proposed facility will not exceed 250 tpy, the proposed RDF processing facility is not classified as a major source and thus, not subject to PSD review. In fact, the proposed processing facility will not emit any of the regulated pollutants in significant quantities, defined by EPA's de minimis emission rates (see Table 5.1-2). The RDF will be mainly burned at UPA's Elk River generating station. Such a fuel switch from coal to RDF is not considered a change in the method of operation for a steam generating unit under the PSD regulations, and thus the UPA facility is also not subject to PSD review.

TABLE 5.1-2  
DE MINIMIS POLLUTANT EMISSIONS

| <u>Pollutants</u>                                        | <u>Emission Rate (tpy)</u> |
|----------------------------------------------------------|----------------------------|
| Carbon monoxide                                          | 100.0                      |
| Nitrogen oxides                                          | 40.0                       |
| Particulates                                             | 25.0                       |
| Sulfur dioxide                                           | 40.0                       |
| Ozone                                                    | 40.0*                      |
| Lead                                                     | 0.6                        |
| Mercury                                                  | 0.1                        |
| Beryllium                                                | 0.0004                     |
| Asbestos                                                 | 0.007                      |
| Fluorides                                                | 3.0                        |
| Sulfuric acid mist                                       | 7.0                        |
| Vinyl chloride                                           | 1.0                        |
| Hydrogen sulfide                                         | 10.0                       |
| Total reduced sulfur<br>(including hydrogen sulfide)     | 10.0                       |
| Reduced sulfur compounds<br>(including hydrogen sulfide) | 10.0                       |

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\*As volatile organic compounds (VOC)

Source: 40 CFR 52.21.

#### 5.1.1.3 Nonattainment Area Regulations

A major new stationary source, or major modification to an existing source, located in a nonattainment area, must obtain new source permits in accordance with the EPA Emission Offset Interpretative Ruling. The new source review of a source located in a nonattainment area requires: (1) compliance with the lowest achievable emission rate (LAER), (2) certified compliance by all other sources in the state, (3) emission offsets greater than one-for-one (or as otherwise provided in an approved SIP), and (4) emission offsets providing a net air quality benefit to the nonattainment area. Major new sources are subject to review under the Offset Ruling only if they emit in major amounts, i.e., 100 tons per year, the pollutant(s) for which the area is designated nonattainment. Similarly, only if a modification increased emissions of a pollutant for which the source is major, and for which the area is designated nonattainment (NA), do nonattainment regulations apply. Since potential emissions of regulated pollutants from the proposed RDF processing facility will not exceed 100 tpy, the proposed facility would not be considered a major source under NA regulations. The RDF will be mainly burned at UPA's Elk River generating station. Such a fuel switch from coal to RDF is not considered a change in the method of operation for a steam generating unit under the NA regulations. Thus the regulations do not apply to the burning of RDF in UPA boilers. The proposed RDF processing facility and Elk River station are both located in an area designated as unclassified. Therefore, the two facilities would not be subject to NA review.

#### 5.1.1.4 New Source Performance Standards

The Clean Air Act mandated that the EPA promulgate New Source Performance Standards (NSPS), a set of national emission standards for stationary sources of air pollution. These standards are applicable to specific categories of sources and apply not only to new sources, but also to modified or reconstructed existing sources of air pollution. As stated in the 1977 Amendments to the Clean Air Act, these standards "shall reflect the degree of emission limitation and the percentage

reduction achievable through application of the best technological system of continuous emission reduction (taking into consideration the cost of achieving such emission reduction, any non-air-quality health and environmental impact and energy requirements) the Administrator determines has been adequately demonstrated." NSPS do not apply to the design or operation of RDF processing facilities.

On June 19, 1984, the EPA proposed NSPS for nonfossil-fuel-fired boilers with a heat input greater than 100 MMBtu/hr (45 DR 67938). These proposed standards would limit particulate emissions from MSW-fired boilers to 0.1 pound per million Btu (lb/MMBtu). In addition, these draft standards would impose a limitation on opacity of 20 percent. A fuel switch from coal to RDF at the Elk River station is not considered a change in the method of operation and thus, not subject to NSPS. However, the combustion of RDF at the Elk River station is expected to generate particulate emissions of approximately 0.076 lb/MMBtu; which is within the proposed limit.

#### 5.1.1.5 National Emission Standards for Hazardous Air Pollutants

Section 112 of the Clean Air Act requires the EPA to publish a list (to be periodically revised) including hazardous air pollutants for which National Emission Standards for Hazardous Air Pollutants (NESHAP) would be developed. Emission standards have been promulgated in 40 CFR 61 for asbestos, beryllium, mercury, and vinyl chloride. To date, the NESHAP do not apply to the design or operation of resource recovery facilities.

Although no NESHAP apply to resource recovery facilities, the impacts of the combustion of RDF at the Elk River generating station for such regulated pollutants as asbestos, beryllium and mercury, and key pollutants from resource recovery facilities as hydrogen chloride and dioxins were determined. The results of these analyses are presented in Sections 6.1 and 6.8.

#### 5.1.1.6 MPCA Air Pollution Control Regulations

##### Emission Limitations

MPCA Control Rules limit the visible emissions from certain air pollution sources to not more than 20 percent opacity at any one time. Performance testing is required to demonstrate compliance with these limitations. MPCA rules do not contain specific emission limits for any other pollutants.

MPCA policy is to require continuous emission monitoring (CEM) for O<sub>2</sub>, CO, CO<sub>2</sub> and furnace temperature for resource recovery facilities which burn more than 250 tons per day (tpd) of RDF. Periodic (in-stack) tests will also be conducted for heavy metals, particle size (once per year), acid gas (once per year for at least two years) and dioxin (once every five years). The purpose of this testing is to ensure that the units have an adequate hydrocarbon destruction efficiency.

##### Odor Emission Limits

Minnesota has developed regulations for the control of odors in the ambient air. These regulations have taken the form of odor emission limits and ambient odor testing. Emission limits are set forth by Minnesota Rules Part 7005.0920 as follows:

- (1) Odor sources emitting from well-defined stacks 50 feet or more above grade elevation and with adequate dispersion characteristics as determined by the Agency shall not emit odors in greater than 150 odor concentration units. (Odor concentration unit shall mean the number of standard cubic feet of odor-free air needed to dilute each cubic foot of contaminated air so that at least 50 percent of the odor concentration test panel does not detect any odor in the diluted mixture.)

- (2) Odor sources of less than 50 feet elevation above grade or otherwise failing to create good dispersion conditions as determined by the Agency shall not emit more than 25 odor concentration units.
- (3) No odor source shall have an odor emission rate in excess of 1,000,000 odor concentration units per minute.
- (4) No odor source shall emit air contaminants into the ambient air which cause odor outside the alleged polluter's property line in excess of the following limitations:
  - One odor unit in areas zoned residential, recreational, institutional, retail sales, hotel or educational;
  - Two odor units in areas zoned light industrial;
  - Four odor units in areas zoned other than those above.

Odor testing is conducted by a panel under the supervision and advisement of the MPCA.

Minnesota Rules Part 7005.0960 specifically states that compliance with odor concentration units/limits does not obviate the existence of a public and/or private nuisance problem.

#### 5.1.1.7 Incineration in Other Regulated Boilers

Municipal solid waste (MSW) will be processed at the Anoka County Resource Recovery Facility into a refuse-derived fuel (RDF). The combustion of such RDF at locations other than the UPA boilers in either new or existing boiler units would result in the following regulatory issues:

- If all the RDF generated was burned in a new incinerator(s) at some individual location, then the combustion of the RDF would come under PSD review as the incinerator(s) would have a charge rate of more than 250 tons per day (tpd) and potential emissions that are greater than 100 tons per year. If such a source were located in a nonattainment (NA) area, potential emissions of the NA pollutant below 100 tpy would be required to avoid NA review.

- If all the RDF generated was burned at separate new or existing boilers each source having less than 250 million British thermal units (Btu) per hour heat input and potential emissions of less than 250 tpy or having more than 250 million Btu per hour heat input and potential emissions of less than 100 tpy; then the combustion of the RDF would not come under PSD review. If such source(s) were located in a NA area, potential emissions of the NA pollutant below 100 tpy would be required to avoid NA review.
- If all the RDF generated was burned at existing steam generating unit(s), the combustion of the RDF would not come under PSD or NA review as a switch to RDF by a steam generating unit is not considered a change in the method of operation of the unit, and thus not a major modification subject to PSD and NA regulations. [The exclusion of a switch to RDF as a major modification is supported by the Resource Conservation and Recovery Act of 1974 where Congress expressed a strong interest in the development and use of RDF as a sound policy basis in reducing the nation's dependence on foreign oil].

Any new incinerator(s) or boiler unit(s) used to burn the RDF would require pollution controls that meet BACT and/or LAER requirements, if the sources are under PSD and/or NA review, and MPCA emission limits. Since a switch to RDF by a steam generating unit is not considered a change in the method of operation of the unit, and thus not subject to PSD and/or NA review, the switch to RDF by an existing steam generating unit would not impose BACT and/or LAER requirements. However, the switch would still require that MPCA emission limits be maintained. Also, a switch from fossil-fuel to RDF combustion would necessitate physical changes to the generating unit(s) and facility. Such changes might include:

- Modifications to the steam generating unit itself to promote more complete combustion
- Modifications to any existing baghouse

- Use of a multicyclone dust collection to protect a baghouse from burning cinders, and ID fans from excessive wear.
- Providing an RDF receiving and storage facility.

#### 5.1.2 Air Quality Impact Analyses

The MPCA will require that an analysis be performed to determine the impact of the proposed project on ambient air quality. Because pollutant emissions from the RDF processing facility will be below de minimis emission rates (see Table 5.1-2), namely below 25 tons per year for particulate matter, the air quality impact of the processing facility should be minimal. However, burning of the RDF at the Elk River Generating Station will result in significant emissions of regulated pollutants. Therefore, compliance with ambient standards due to these operations must be demonstrated.

Total air quality levels are determined by combining projected concentrations with existing background levels. Background can be estimated through modeling of existing sources, from existing ambient measurements, or a combination thereof.

The EPA has defined a set of impact levels used to determine whether a source or modification will "significantly" affect an area as shown in Table 5.1-3. These concentration thresholds are interpreted by EPA and MPCA as representing the minimum amount of ambient impact that is significant. In general, the EPA and MPCA do not intend to analyze the impact of a source beyond the point where its contribution falls below those levels indicated in Table 5.1-3.

A comparison of the values presented in Tables 5.1-3 and 5.1-1 shows that the significant impact levels (SILs) are substantially below the ambient standards. For example, the SILs for SO<sub>2</sub> are less than 2 percent of the ambient standards for all averaging periods. Therefore, just because a source is predicted to cause an air quality impact above the SIL (hence, a "significant" impact) does not mean that emissions from the source alone will result in a violation of the NAAQS. Rather, the facility's impact plus the impact of other background sources are compared to the NAAQS to determine the potential for possible violations.

TABLE 5.1-3  
SIGNIFICANT IMPACT LEVELS

| <u>Pollutant</u>  | <u>Averaging Period</u> |               |               |                |               |
|-------------------|-------------------------|---------------|---------------|----------------|---------------|
|                   | <u>1-Hour</u>           | <u>3-Hour</u> | <u>8-Hour</u> | <u>24-Hour</u> | <u>Annual</u> |
| SO <sub>2</sub> * | --                      | 0.01          | --            | 0.002          | 0.0004        |
| TSP**             | --                      | --            | --            | 5              | 1             |
| NO <sub>2</sub> * | --                      | --            | --            | --             | 0.0005        |
| CO*               | 1.75                    | --            | 0.45          | --             | --            |

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Note: These levels are not to be exceeded.

\*Concentrations in parts per million (ppm).

\*\*Concentrations in micrograms per cubic meter (  $\mu\text{g}/\text{m}^3$  ).

Source: Appendix S to 40 CFR 51 and PSD Workshop Manual, U.S. EPA,  
Oct. 1980.

The primary purpose of comparing modeled concentrations with the SILs is to establish a source's significant impact area for each pollutant. Major background sources located in the proposed source's pollutant-specific significant impact area are generally modeled as part of the air quality impact analysis. Therefore, the SILs are a regulatory tool and are not of themselves measures of adverse impacts.

The air quality impact analyses demonstrating the extent, if any, of compliance with ambient air quality standards are documented in Section 6.1.

### 5.1.3 Climatology

The project area has a continental-type climate which is characterized by wide variations in temperature, ample summer rainfall, and light to moderate winter precipitation. Mean seasonal temperatures, as measured at the Minneapolis-St. Paul International Airport, range from approximately 16°F in winter to 70°F in summer. Temperature extremes show a marked contrast with a recorded minimum of -34°F and maximum of 104°F. High and low pressure systems moving across the area cause frequent (and often rapid) changes in temperature, particularly in winter and spring. From May through September, the average total rainfall is about 17 inches, which accounts for approximately 65 percent of the annual total precipitation of 27 inches. Winter precipitation consists mostly of snow, which averages about 46 inches a season. Thunderstorms are the principal source of precipitation in spring and summer. Thunderstorms accompanied by hail, and other severe storms (such as tornadoes, glaze, and blizzard conditions), occur often enough to warrant consideration in facility design and construction. Monthly mean temperature and precipitation data measured at the Minneapolis-St. Paul International Airport are given in Table 5.1-4.

The joint frequency distributions of wind direction and speed (wind rose) from surface data taken at Minneapolis-St. Paul International Airport for the 15-year period 1958-1972 are shown in Figures 5.1-1 through 5.1-4 for each of the four seasons. Winds from the northwest to north are most frequent in winter and spring, occurring about 30

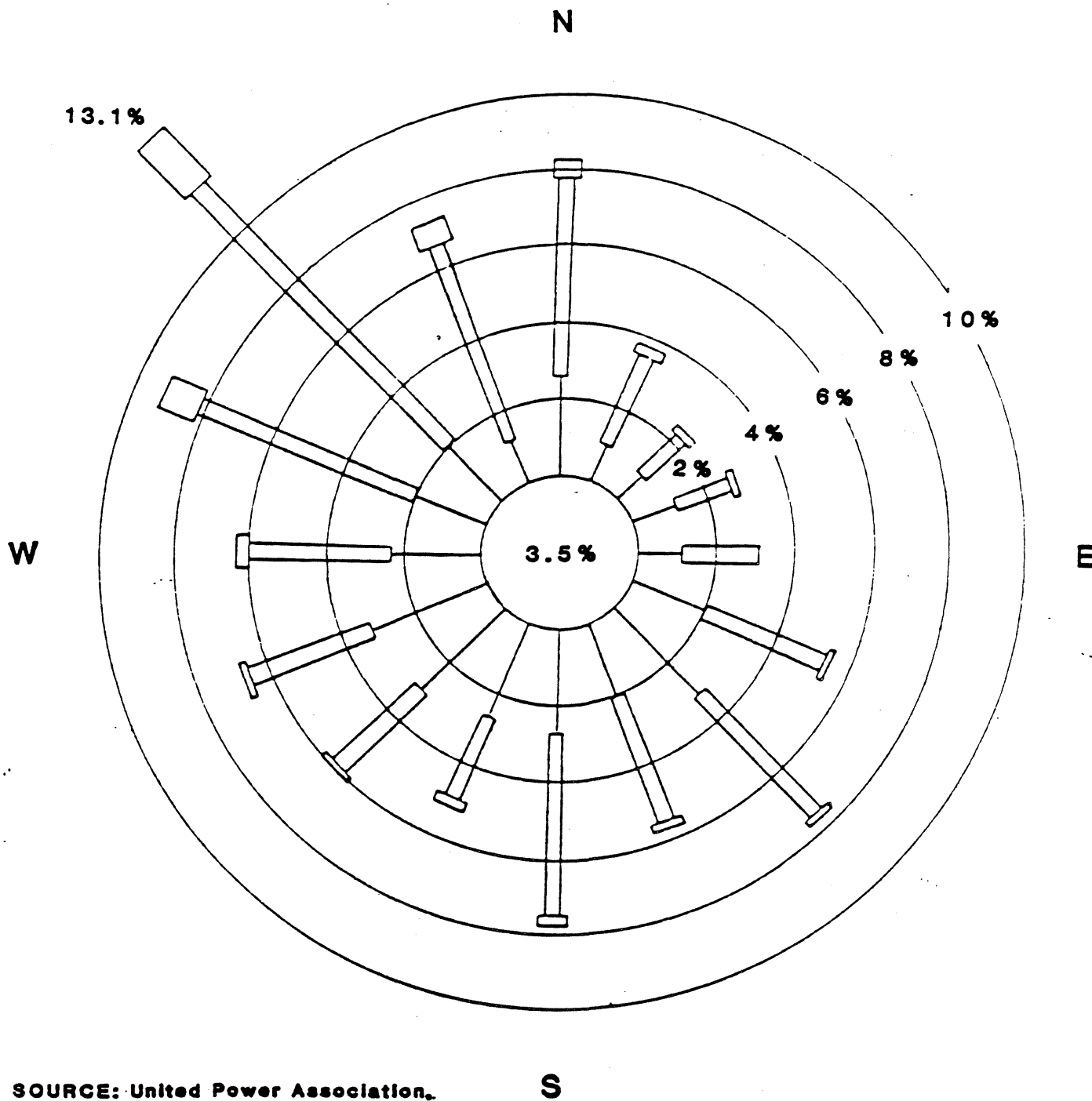
TABLE 5.1-4  
SUMMARY OF MEAN MONTHLY CLIMATOLOGICAL CONDITIONS:  
MINNEAPOLIS-ST. PAUL AREA, 1891-1978

| <u>Month</u> | <u>Temperature<br/>(°F)</u> | <u>Precipitation<br/>(inches)</u> | <u>Snowfall<br/>(inches)<sup>1</sup></u> |
|--------------|-----------------------------|-----------------------------------|------------------------------------------|
| January      | 12.9                        | 0.82                              | 9.1                                      |
| February     | 16.8                        | 0.85                              | 8.2                                      |
| March        | 29.7                        | 1.53                              | 10.6                                     |
| April        | 45.9                        | 2.12                              | 2.5                                      |
| May          | 58.0                        | 3.37                              | 0.2                                      |
| June         | 67.9                        | 4.14                              | 0.0                                      |
| July         | 73.1                        | 3.44                              | 0.0                                      |
| August       | 70.6                        | 3.26                              | 0.0                                      |
| September    | 61.5                        | 2.86                              | 0.1                                      |
| October      | 49.9                        | 1.98                              | 0.4                                      |
| November     | 33.0                        | 1.36                              | 6.1                                      |
| December     | 19.3                        | 0.91                              | 9.2                                      |
| Annual       |                             |                                   |                                          |
| Mean         | 44.9                        | 26.64                             | 46.3                                     |

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<sup>1</sup>From 1939-1978.

Source: The Weather Almanac, 1981.



**SOURCE:** United Power Association, October 1977, "Elk River Steam Plant Coal Conversion: Air Dispersion Modeling." Elk River, Minnesota.

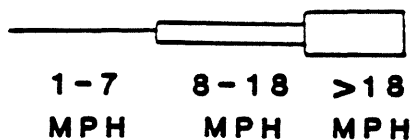
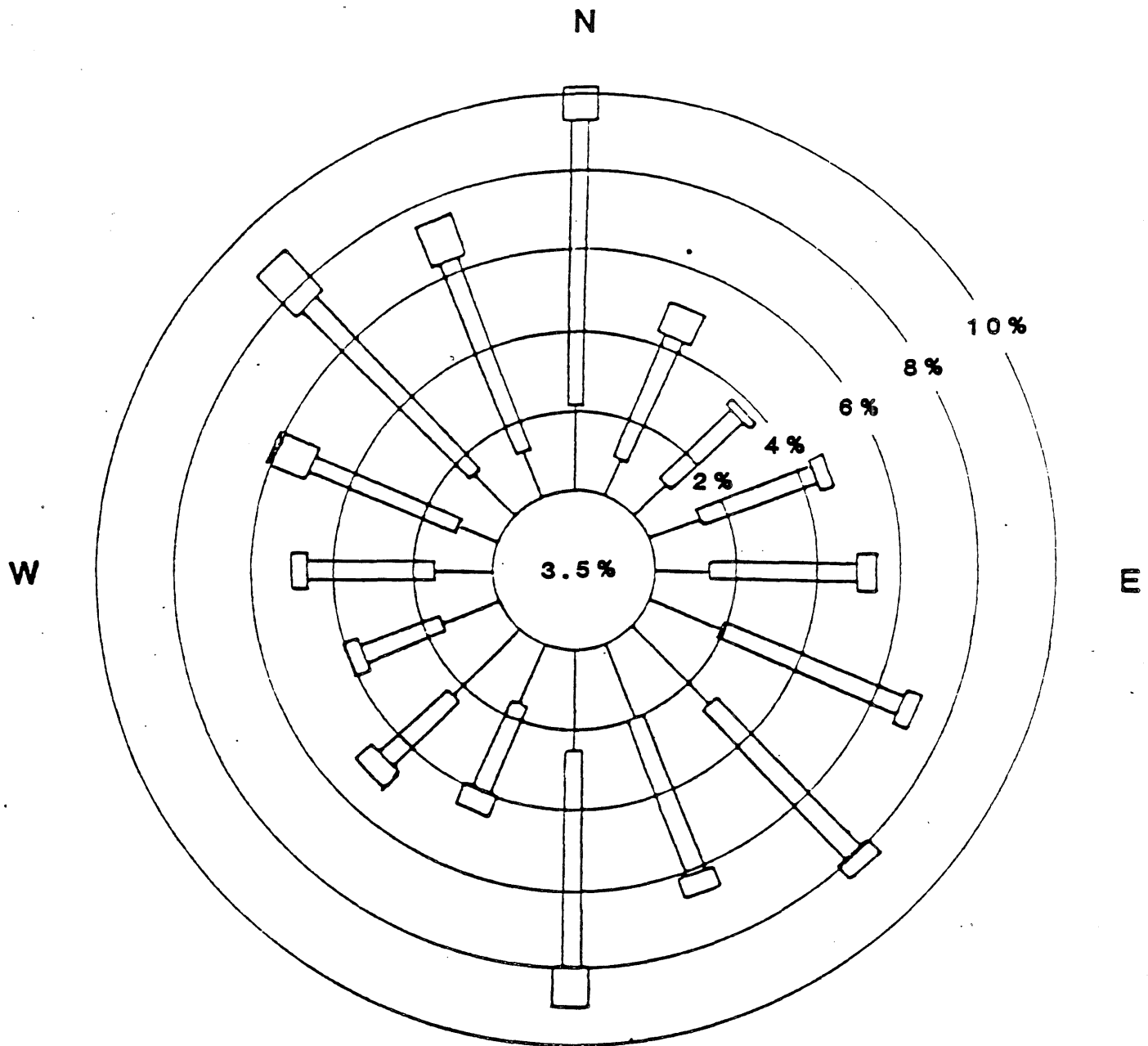


**Figure 5.1-1** Minneapolis-St. Paul International Airport Surface Wind Rose, Winter (Dec. - Feb. 1958-1972)



**SOURCE:** United Power Association,  
October 1977. "Elk River Steam Plant  
Coal Conversion: Air Dispersion  
Modeling." Elk River, Minnesota.

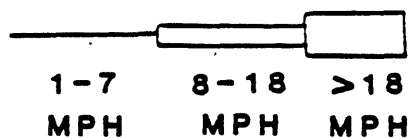
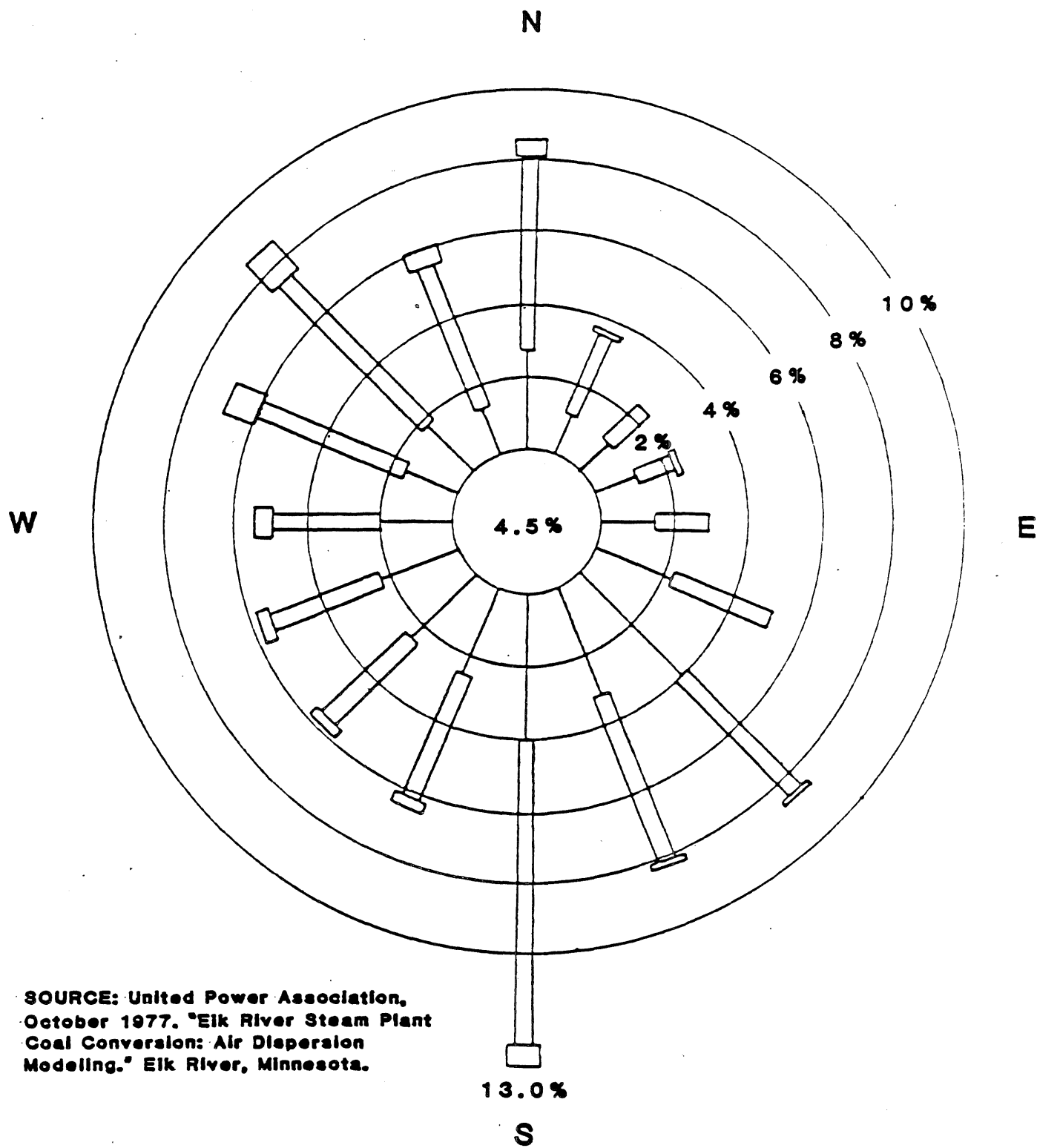


Figure 5.1-2 Minneapolis-St. Paul International Airport Surface Wind  
Rose, Spring (Mar. - May 1958-1972)





**SOURCE:** United Power Association,  
October 1977. "Elk River Steam Plant  
Coal Conversion: Air Dispersion  
Modeling." Elk River, Minnesota.

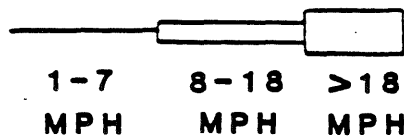


Figure 5.1-4 Minneapolis-St. Paul International Airport Surface Wind  
Rose, Fall (Sep. - Nov. 1958-1972)

percent of the time, whereas south to southeast winds are most frequent in summer and fall, occurring slightly less than 30 percent of the time. Outbreaks of polar and Arctic air moving southward from Canada into the Great Plains result in the north to northwest flow. Southeast to south winds result from a return flow on the back side of high pressure cells centered over the eastern U.S., or from flow ahead of storm systems which move over and to the north of the area.

Thus, the general weather systems that influence Minnesota are characterized by surface winds primarily from the northwest to north during the winter months and southeast to south during the summer months. Precipitation concurrent with northwest-north winds in the colder months occur primarily in the form of snow. High wind speeds, occasionally reaching blizzard proportions, occur with large-scale storm systems. During late spring and summer, the predominance of shower and thunderstorm activity is associated with fronts or squall lines that move through the area.

#### 5.1.4 Existing Ambient Air Quality

The UPA operated two monitoring stations which measured  $\text{SO}_2$  and TSP levels around the Elk River generating station until 1983. The limited operations at the Elk River station over recent years, being used mainly as a peaking unit, resulted in measured  $\text{SO}_2$  and TSP concentrations that are well below ambient standards and essentially reflected regional background levels over the area. Because such regional background levels could be adequately tracked by other monitoring stations, monitoring at these two sites ceased by the end of 1982. Ozone monitoring is currently conducted by the MPCA in Anoka County. No continuous measurements of  $\text{NO}_2$  and CO, and measurements of lead are taken at monitoring sites located in the project area. However, such measurements are taken at monitoring stations operated by the MPCA in the City of Minneapolis.

Monitoring stations in the project area and those stations outside the project area that may be useful in estimating background levels are listed in Table 5.1-5. The East Highway 169 & North BN RR Tracks, and 729 Main St. monitors are located about 700 meters east-southeast and

TABLE 5.1-5  
AIR QUALITY MONITORING SITES

| <u>Site No.</u>      | <u>Site Location</u>          | <u>Pollutants Measured</u> |
|----------------------|-------------------------------|----------------------------|
| <u>MPCA Stations</u> |                               |                            |
| 936                  | 7th St. & Hennepin Ave.       | CO, SO <sub>2</sub>        |
| 940                  | 143 13th Ave. Northeast       | NO <sub>2</sub> , TSP      |
| 945                  | 300 Nicollet Mall             | Pb, TSP, PM10 <sup>a</sup> |
| 949                  | 1829 Portland Ave. South      | CO, SO <sub>2</sub>        |
| 6010                 | Anoka County Airport (Blaine) | O <sub>3</sub>             |
| 6014                 | Cedar Creek Natural History   | O <sub>3</sub>             |
| <u>UPA Stations</u>  |                               |                            |
| 9051                 | E. Hwy 169 & N BN RR Track    | SO <sub>2</sub> , TSP      |
| 9052                 | Bank 729 Main St. (Elk River) | SO <sub>2</sub> , TSP      |

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<sup>a</sup>Particulate matter less than 10 microns in diameter.

Source: MPCA, 1986

1100 meters northwest of the Elk River station, respectively, and provide representative SO<sub>2</sub> and TSP background levels of the project area. The monitoring stations in Anoka County which measure ozone are located about 30 kilometers to the east-northeast (Cedar Creek National History) and east-southeast (Anoka County Airport) of Elk River and provide representative levels of this regionally reactive pollutant. The monitoring stations in the City of Minneapolis are located about 40 kilometers south-southeast of the project area. The stations at 7th St. & Hennepin Ave. and 1829 Portland Ave. South provide CO data; at 1143 13th Ave. Northeast NO<sub>2</sub> data, and at 300 Nicollet Mall lead data. Minneapolis' population size and industrial base should result in CO, NO<sub>2</sub> and lead concentrations that are higher than would be expected over the Elk River area. Therefore, the use of this data in estimating background levels of these pollutants would tend to overstate (be conservative) the actual background levels of the project area.

Continuous monitoring data are obtained for SO<sub>2</sub>, CO, NO<sub>2</sub> and ozone at the above sites. Lead and TSP are sampled for 24-hour periods every six days. Appropriate annual, and highest and second-highest short-term concentrations for SO<sub>2</sub> and TSP monitored around Elk River during the three-year period 1980 through 1982 are listed in Table 5.1-6 and for the remaining pollutants at the other monitoring locations over the past three years (1983 through 1985) in Table 5.1-7.

#### Sulfur Dioxide (SO<sub>2</sub>)

Annual, as well as highest and second-highest 24-hour, and 1-hour average SO<sub>2</sub> concentrations for the E.Highway 169 & N.BN RR Tracks and 729 Main St. monitors are given in Table 5.1-6. Annual average concentrations over the period are less than 17 percent of the 0.03 ppm primary NAAQS and 25 percent of the 0.02 ppm Minnesota standard. The second-highest 24-hour average concentrations are no more than 20 percent of the 0.14 ppm primary NAAQS, whereas the second-highest 1-hour average concentrations are also less than 20 percent of the 0.50 ppm Minnesota primary 1-hour standard and 30 percent of the 0.35 ppm Minnesota secondary 1-hour standard. Allowing for year-to-year

TABLE 5.1-6  
SULFUR DIOXIDE AND PARTICULATE LEVELS MEASURED AROUND  
THE UPA ELK RIVER POWER STATION OVER THE  
THREE-YEAR PERIOD 1980 THROUGH 1982

| <u>Pollutant</u>     | <u>Averaging Time</u> | MPCA<br><u>Monitoring Station No.</u> | <u>Concentration (parts per million)</u> |                    |                |                    |                |                    |
|----------------------|-----------------------|---------------------------------------|------------------------------------------|--------------------|----------------|--------------------|----------------|--------------------|
|                      |                       |                                       | <u>1980</u>                              |                    | <u>1981</u>    |                    | <u>1982</u>    |                    |
|                      |                       |                                       | <u>Highest</u>                           | <u>2nd Highest</u> | <u>Highest</u> | <u>2nd Highest</u> | <u>Highest</u> | <u>2nd Highest</u> |
| Sulfur dioxide       | 1-Hour                | 9051                                  | 0.080                                    | 0.070              | 0.045          | 0.045              | 0.085          | 0.065              |
|                      |                       | 9052                                  | 0.100                                    | 0.075              | 0.040          | 0.035              | 0.020          | 0.020              |
|                      | 24-Hour               | 9051                                  | 0.026                                    | 0.025              | 0.013          | 0.010              | 0.012          | 0.005              |
|                      |                       | 9052                                  | 0.029                                    | 0.028              | 0.013          | 0.013              | 0.011          | 0.006              |
|                      | Annual                | 9051                                  | 0.005                                    | --                 | 0.001*         | --                 | <0.001         | --                 |
|                      |                       | 9052                                  | 0.004                                    | --                 | 0.001*         | --                 | <0.001         | --                 |
| Particulate** matter | 24-Hour               | 9051                                  | 125                                      | 112                | 97             | 80                 | 89             | 88                 |
|                      |                       | 9052                                  | 206                                      | 136                | 123            | 119                | 97             | 84                 |
|                      | Annual                | 9051                                  | 36                                       | --                 | 32             | --                 | 27             | --                 |
|                      |                       | 9052                                  | 52                                       | --                 | 47             | --                 | 35             | --                 |

\*Data capture below 75 percent. A data capture of at least 75 percent over the averaging peiroad is required by EPA in order for a measurement to be valid.

\*\*Concentrations in micrograms per cubic meter.

Source: MPCA, 1985.

TABLE 5.1-7  
NITROGEN DIOXIDE, CARBON MONOXIDE, OZONE, AND LEAD LEVELS MEASURED  
OVER THE THREE-YEAR PERIOD 1983 THROUGH 1985

| Pollutant        | Averaging Time | MPCA Monitoring Station No. | Concentration (parts per million) |             |         |             |         |             |
|------------------|----------------|-----------------------------|-----------------------------------|-------------|---------|-------------|---------|-------------|
|                  |                |                             | 1983                              |             | 1984    |             | 1985    |             |
|                  |                |                             | Highest                           | 2nd Highest | Highest | 2nd Highest | Highest | 2nd Highest |
| Nitrogen dioxide | Annual         | 940                         | 0.017                             | --          | 0.015*  | --          | 0.014   | --          |
| Carbon monoxide  | 1-hour         | 936                         | 22.6                              | 15.3        | 13.3    | 13.3        | 14.2    | 13.8        |
|                  |                | 949                         | 14.7                              | 8.4         | 12.8    | 12.3        | 7.7     | 7.4         |
|                  | 8-hour         | 936                         | 9.7                               | 8.4         | 8.1     | 8.0         | 7.6     | 7.5         |
|                  |                | 949                         | 5.6                               | 5.5         | 8.7     | 6.3         | 4.8     | 4.3         |
| Ozone            | 1-hour         | 6010                        | 0.13                              | 0.12        | 0.13    | 0.12        | 0.08    | 0.08        |
|                  |                | 6014                        | 0.12                              | 0.11        | 0.10    | 0.09        | 0.09    | 0.08        |
| Lead**           | Quarterly      | 945                         | 0.28                              | --          | 0.25    | --          | 0.10    | --          |

\*Data capture below 75 percent. A data capture of at least 75 percent over the average period is required by EPA in order for a measurement to be valid.

\*\*Concentrations in micrograms per cubic meter.

Source: MPCA, 1986

variations, the general trend in  $\text{SO}_2$  concentrations at these monitoring sites over the three-year period was downward with concentrations being well within ambient standards.

#### Total Suspended Particulates (TSP)

Annual, highest and second-highest 24-hour TSP concentrations for the E.Highway 169 & N.BN RR Tracks and 729 Main St. monitors are shown in Table 5.1-6. Annual concentrations are less than 70 percent of the  $75 \mu\text{g}/\text{m}^3$  primary NAAQS and 87 percent of the more restrictive Minnesota secondary standard of  $60 \mu\text{g}/\text{m}^3$ . The second-highest 24-hour concentrations over the three-year period are less than 53 percent of the  $260 \mu\text{g}/\text{m}^3$  primary NAAQS, and 91 percent of the  $150 \mu\text{g}/\text{m}^3$  secondary NAAQS. The trend in TSP concentrations at these monitoring sites over the three-year period was downward with concentrations being well within ambient standards by the end of the period.

#### Carbon Monoxide (CO)

Table 5.1-7 gives the highest and second-highest 8-hour and 1-hour average CO concentrations over the past three years for the 7th St. & Hennepin Ave. and 1829 Portland Ave. South monitors. The second highest 8-hour average concentrations are less than 95 percent of the primary NAAQS, whereas the second highest 1-hour average concentrations are no more than 45 percent of the primary NAAQS and 51 percent of the more restrictive Minnesota 1-hour standard. Because of the high traffic density of the metropolitan area, these levels are probably much higher than would occur over the project area.

#### Nitrogen Dioxide ( $\text{NO}_2$ )

Annual average  $\text{NO}_2$  concentrations for the past three years are given in Table 5.1-7 for the 143 13th Ave. NE monitor. At less than 35 percent of the standard, these concentrations are well below the primary NAAQS.

### Lead (Pb)

Quarterly average lead concentrations for the past three years are given in Table 5.1-7 for the 300 Nicollett Mall monitor. These concentrations are less than 20 percent of the primary NAAQS.

### Ozone (O<sub>3</sub>)

Table 5.1-7 gives the Highest and second-highest 1-hour average O<sub>3</sub> concentrations over the past three years for the Cedar Creek Natural History and Anoka County Airport monitors. The second highest 1-hour average concentrations are at or below the primary NAAQS.

### Non-criteria Pollutants

No monitoring data are available for pollutants other than those previously discussed, i.e., the criteria pollutants.

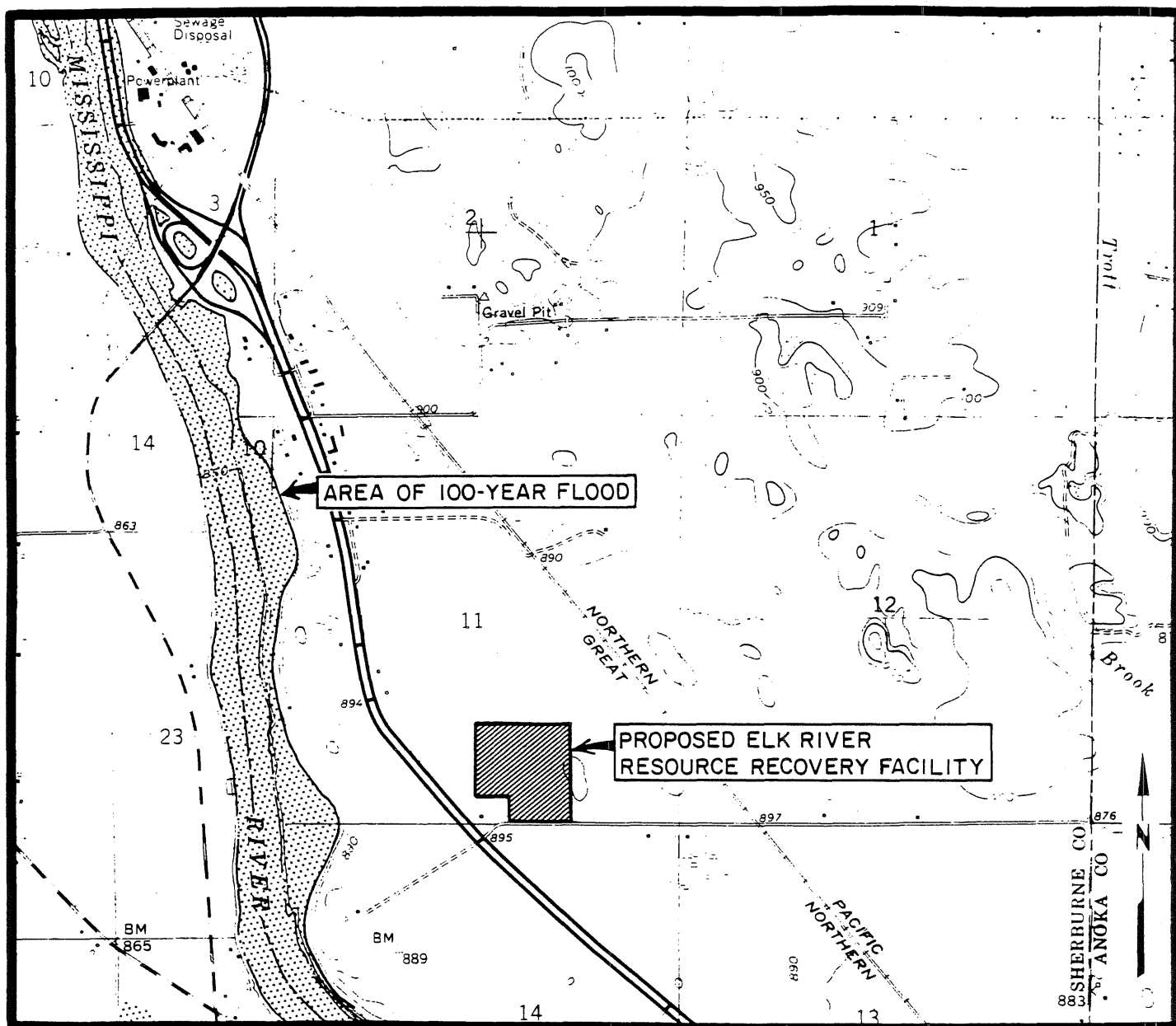
### Conclusion

In summary, pollutant concentrations measured at monitors within the region show air quality in the area to be generally good. Sulfur dioxide, nitrogen dioxide and lead levels are well below the ambient standards, whereas particulate, carbon monoxide and ozone concentrations are somewhat more elevated but at levels still below these standards.

## 5.2 Water Quality Baseline Conditions

### 5.2.1 Surface Water

The proposed Anoka County Resource Recovery Facility site is located in the City of Elk River, about one-half mile east of the Mississippi River, in the Upper Mississippi River drainage basin. As shown in Figure 5.2-1, the site is outside the 100-year flood plain as delineated by the Federal Emergency Management Agency (FEMA, 1981).



SCALE  
0 1000 2000  
(IN FEET)

Figure 5.2-1 100-Year Flood Zone

The closest United States Geological Survey (USGS) gaging station on the Mississippi River is near Anoka, a few miles downstream from the site. At this location, the river drains approximately 19,100 square miles and the average stream flow is 7,655 cubic feet per second (cfs). The maximum recorded discharge for this station is 91,000 cfs, observed on April 17, 1965. The minimum recorded discharge is 529 cfs, observed on October 29, 1976. Table 5.2-1 presents the flood frequency data for the gaging station near Anoka. The flow at this station is partially regulated by six reservoirs on the headwaters.

The proposed site drains to the northwest into wetlands which eventually flow into the Mississippi River. The wetlands moderate the quantity and quality of stormwater runoff from adjacent areas. They stabilize streamflow by impounding runoff in open ponds. The detained water is then either recharged into the ground or slowly released during dry periods, contributing to the flow in the Mississippi River. The wetlands also act as a soil filter since nutrients are adsorbed by the organic soils, and suspended matter settles out during detention. These wetlands are an important feature of the local drainage system.

The site itself is nearly flat, with sandy soils. Currently under row-crop cultivation, the site produces the following runoff volumes during various 24-hour design storms (estimated using the SCS method, SCS 1972):

| <u>Design Storm</u> | <u>Runoff Volume</u> |
|---------------------|----------------------|
| 10-year             | 5.7 acre-feet        |
| 25-year             | 6.8 acre-feet        |
| 50-year             | 8.5 acre-feet        |

In this region, the water quality of the Mississippi River is generally good. Occasionally, high fecal coliform counts have been recorded. The reach from the County State Aid Highway 7 bridge in St. Cloud (approximately 50 miles upstream from the site) to the upper Lock and Dam at St. Anthony Falls in Minneapolis (approximately 15 miles downstream from the site), is classified as 1C,2B,3B by the Minnesota Pollution Control Agency (MPCA). This classification indicates that water quality is adequate to allow use for:

TABLE 5.2-1  
 FLOOD FREQUENCY DATA AT USGS STREAM GAGING STATION 05288500  
 (MISSISSIPPI RIVER NEAR ANOKA, MN)  
 SOURCE: METROPOLITAN WASTE CONTROL COMMISSION (1977)

| <u>Recurrence Interval</u> | Peak<br>Discharge<br><u>(cfs)</u> | Gage Height<br><u>(Feet)</u> |
|----------------------------|-----------------------------------|------------------------------|
| 10-year                    | 57,400                            | 14.35                        |
| 25-year                    | 73,200                            | 16.92                        |
| 50-year                    | 85,200                            | 18.76                        |
| 100-year                   | 98,000                            | 20.46                        |
| 500-year                   | 129,000                           | 24.34                        |

1. domestic consumption following treatment by coagulation, sedimentation, filtration, storage, and chlorination sufficient to meet the Public Health Service Drinking Water Standards (1962);
2. propagation and maintenance of cool or warm water fish and all types of aquatic recreation including bathing; and
3. general industrial purposes (except food processing) following moderate treatment.

Tables 5.2-2, 5.2-3, and 5.2-4 contain the applicable Minnesota Water Quality Standards.

Process wastewaters produced by in-plant washdown of the tipping floor would likely be collected and discharged to the City of Elk River Wastewater Treatment Plant. This plant, located approximately 2 miles north of the proposed RDF facility, is designed to treat 1.04 million gallons per day (mgd) of wastewater. The current average daily flow is approximately 0.6 mgd. The treatment plant consists of the following unit operations:

- grit removal
- primary settling
- trickling filter
- rotating biological discs
- secondary clarification
- chlorination
- anaerobic digesters

Treated effluent is discharged to the Mississippi River. Permit conditions and typical effluent quality applicable to the plant are presented in Table 5.2-5. Sludge is hauled from the treatment plant following digestion and land-applied in local fields.

It is possible that wash-down water would be treated on site, depending upon its strength and the feasibility of such treatment. Treated effluent could be discharged to the existing surface water drainage ways. The treatment method would be subject to review and approval of the MPCA.

TABLE 5.2-2  
MINNESOTA WATER QUALITY STANDARDS

Class 1C: Domestic consumption following treatment by coagulation, sedimentation, filtration, storage, and chlorination sufficient to meet the Public Health Service Drinking Water Standards (1962).

| <u>Substance or Characteristic</u>     | <u>Limit or Range</u>                                                                                                                                                       |
|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Total coliform organisms               | 1 most probable number/100 ml                                                                                                                                               |
| Turbidity value                        | 25                                                                                                                                                                          |
| Color value                            | 15                                                                                                                                                                          |
| Threshold odor number                  | 3                                                                                                                                                                           |
| Methylene blue active substance (MBAS) | 0.5 mg/l                                                                                                                                                                    |
| Arsenic (As)                           | 0.01 mg/l                                                                                                                                                                   |
| Chlorides (Cl)                         | 250 mg/l                                                                                                                                                                    |
| Copper (Cu)                            | 1 mg/l                                                                                                                                                                      |
| Carbon Chloroform extract              | 0.2 mg/l                                                                                                                                                                    |
| Cyanides (CN)                          | 0.01 mg/l                                                                                                                                                                   |
| Fluorides (F)                          | 1.5 mg/l                                                                                                                                                                    |
| Iron (Fe)                              | 0.3 mg/l                                                                                                                                                                    |
| Manganese (Mn)                         | 0.005 mg/l                                                                                                                                                                  |
| Nitrates (NO <sub>3</sub> )            | 45 mg/l                                                                                                                                                                     |
| Phenol                                 | 0.001 mg/l                                                                                                                                                                  |
| Sulfates (SO <sub>4</sub> )            | 250 mg/l                                                                                                                                                                    |
| Total dissolved solids (TDS)           | 500 mg/l                                                                                                                                                                    |
| Zinc (Zn)                              | 5 mg/l                                                                                                                                                                      |
| Barium (Ba)                            | 1 mg/l                                                                                                                                                                      |
| Cadmium (Cd)                           | 0.01 mg/l                                                                                                                                                                   |
| Chromium, Hexavalent (Cr+6)            | 0.05 mg/l                                                                                                                                                                   |
| Lead (Pb)                              | 0.05 mg/l                                                                                                                                                                   |
| Selenium (Se)                          | 0.01 mg/l                                                                                                                                                                   |
| Silver (Ag)                            | 0.05 mg/l                                                                                                                                                                   |
| Radioactive material                   | Not to exceed the lowest concentrations permitted to be discharged to an uncontrolled environment as prescribed by the appropriate authority having control over their use. |

TABLE 5.2-3

Class B: Propagation and maintenance of cool or warm water fish and all types of aquatic recreation including loathing.

| <u>Substance or Characteristic</u> | <u>Limit or Range</u>                                                                                                                                                                                                                                                     |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dissolved Oxygen                   | not less than 5 mg/l at all times                                                                                                                                                                                                                                         |
| Temperature                        | 5°F above natural in streams and 3°F above natural in lakes, based on monthly average of the maximum daily temperature, except in no case shall it exceed a daily average of 86°F.                                                                                        |
| Ammonia (N)                        | 0.04 mg/l (un-ionized an N)                                                                                                                                                                                                                                               |
| Chromium (Cr)                      | 0.05 mg/l                                                                                                                                                                                                                                                                 |
| Copper (Cu)                        | 0.01 mg/l, less than 1/10 the 96-hour TLM value                                                                                                                                                                                                                           |
| Cyanides (CN)                      | 0.02 mg/l                                                                                                                                                                                                                                                                 |
| Oil                                | 0.5 mg/l                                                                                                                                                                                                                                                                  |
| pH                                 | 6.5-9.0                                                                                                                                                                                                                                                                   |
| Phenols                            | 0.01 mg/l and none that could impact odor or taste to fish flesh or other fresh-water edible products such as crayfish, clams, prawns, and like creatures.                                                                                                                |
| Turbidity value                    | 25                                                                                                                                                                                                                                                                        |
| Fecal coliform organisms           | 200 organisms/100 ml as a logarithmic mean measured in not less than five samples in any calendar month, nor shall more than 10% of all samples taken during any calendar month individually exceed 2000 organisms/100 ml. (Applies only between March 1 and October 31). |
| Radioactive Materials              | Not to exceed the lowest concentration permitted to be discharged to an uncontrolled environment as prescribed by the appropriate authority having control over their use.                                                                                                |
| Total Residue Chlorine             | 0.005 mg/l                                                                                                                                                                                                                                                                |

TABLE 5.2-4

Class 3B: General industrial purposes (except food processing)  
following moderate treatment.

| <u>Substance or Characteristic</u> | <u>Limit or Range</u>                                                                                                                                                          |
|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Arsenic (As)                       | 0.05 mg/l                                                                                                                                                                      |
| Barium (Ba)                        | 1 mg/l                                                                                                                                                                         |
| Cadmium (Cd)                       | 0.01 mg/l                                                                                                                                                                      |
| Chromium (Cr +6)                   | 0.05 mg/l                                                                                                                                                                      |
| Cyanide (CN)                       | 0.2 mg/l                                                                                                                                                                       |
| Fluoride (F)                       | 1.5 mg/l                                                                                                                                                                       |
| Lead (Pb)                          | 0.05 mg/l                                                                                                                                                                      |
| Selenium (Se)                      | 0.01 mg/l                                                                                                                                                                      |
| Silver (Ag)                        | 0.05 mg/l                                                                                                                                                                      |
| Radioactive Material               | Not to exceed the lowest concentrations permitted to be distinguished to an uncontrolled environment as prescribed by the appropriate authority having control over their use. |
| Chlorides (Cl)                     | 100 mg/l                                                                                                                                                                       |
| Hardness                           | 250 mg/l                                                                                                                                                                       |
| pH                                 | 6.0-9.0                                                                                                                                                                        |

TABLE 5.2-5  
INFUEENT AND EFFLUENT QUALITY\*  
ELK RIVER WASTEWATER TREATMENT PLANT

| <u>Parameter</u>       | <u>Units</u> | <u>Influent</u> | <u>Effluent</u> | <u>Effluent<br/>Permit Limit</u> |
|------------------------|--------------|-----------------|-----------------|----------------------------------|
| Flow                   | mgd          | 0.388           | -               | 1.04                             |
| 5-day BOD              | mg/l         | 258             | 17              | 25                               |
| Total suspended solids | mg/l         | 107             | 7               | 30                               |
| Settleable solids      | mg/l         | 7               | 0               | 30                               |
| pH range               | SU           | -               | 7.3-7.7         | 6.5-8.5                          |
| Fecal Coliforms        | No./100ml    | -               | -               | 200                              |
| Chlorine Residual      | mg/l         | -               | -               | -                                |
| Dissolved Oxygen       | mg/l         | -               | 6.0             | -                                |

\*Average values from January 1986 NPDES Permit Report.

### 5.2.2 Ground Water

The site is located along the northwest edge of the extensively studied metropolitan area geologic basin. In the Twin Cities, there are several layered water-bearing bedrock formations overlain by glacial drift. In order of age, beginning with the youngest, these formations are the Decorah Shale, the Platteville Limestone, the St. Peter Sandstone, the Prairie-du-Chien Group, the Jordan Sandstone, the St. Lawrence Formation, the Franconia Formation, the Ironston Formation, the Galesville Formation, the Eau Claire Formation, the Mount Simon Formation, the Hinckley Sandstone, the Fond du Lac Formation, and the Solar Church Formation. Moving north and northwest from the center of the basin, the various bedrock units subcrop beneath the glacial drift sequentially, beginning with the youngest formations. In the metropolitan region, 80 percent of the ground water used is obtained from the Prairie-du-Chien-Jordan aquifer and 10 percent is obtained from the Mt. Simon-Hinckley aquifer. The remainder is from all other aquifers.

At the site of the proposed RDF facility, five geologic units are present beneath the glacial drift: the Eau Claire formation, the Mt. Simon formation, the Hinckley sandstone, the Fond du Lac formation and the Solar Church formation. The Eau Claire formation is composed of alternating layers of siltstone, sandstone, and shale. This unit is very low in permeability and is an aquitard, a semiconfining layer of lower permeability.

The Mt. Simon and Hinckley units together form a major artesian aquifer which is confined by the Eau Claire aquitard. The Mt. Simon-Hinckley aquifer is a highly permeable thick, sandstone with some siltstone and shale.

The Fond du Lac and Solar Church Formations are a thick succession of red shales and fine grained sandstones. These formations are too compact and dense to yield appreciable quantities of water.

Two water supply wells adjacent to the site encountered glacial drift from 0 to 150 feet, the Eau Claire Aquitard from 150 to 250 feet, and the Mt. Simon-Hinckley Aquifer below 250 feet. The well completed in the Mt. Simon-Hinckley formation extended to a depth of 315 feet without entering the underlying Fond du Lac formation.

In the region near the proposed site, both the glacial drift and the Mt. Simon-Hinckley aquifer are used for water supply. Local domestic supply wells screened in the glacial drift have the potential to yield 100 to 500 gpm. Municipal and industrial supply wells screened in the Mt. Simon-Hinckley aquifer have recorded yields of up to 2000 pgm. Either aquifer can provide sufficient water for the proposed facility.

The quality of water withdrawn from the glacial drift or the Mt. Simon-Hinckley aquifer is fairly good. In many regions, however, high iron (up to 1.0 mg/l), high manganese (up to 1.1 mg/l), and excessive hardness (up to 430 mg/l as  $\text{CaCO}_3$ ) require treatment of the water prior to domestic consumption or industrial use.

Approximately ten percent of the mean annual precipitation of 27 inches is available, after evaporation and surface runoff, for ground-water recharge. The Mt. Simon-Hinckley aquifer is recharged primarily by direct vertical infiltration in areas where the formations subcrop beneath permeable glacial material. In addition, some recharge can be attributed to vertical leakage from overlying formations. At the proposed site the Eau Claire aquitard prevents direct infiltration from the land surface to the Mt. Simon-Hinckley aquifer, so recharge is limited to vertical leakage through the Eau Claire formation.

### 5.3 Solid Waste

#### 5.3.1 Waste Volume

The estimated volumes of municipal solid waste have been determined by studies undertaken by Anoka County in 1982, 1984 and 1985. The most recent study, "Anoka County Solid Waste Quantity Study" by Pope-Reid Associates, dated December 1985, was relied upon in this DEIS. This study used data collected during the winter, spring, summer and autumn and involved a detailed weighing and interviewing program.

The results of the study indicate that 562 tons per day of municipal solid waste were generated in 1985 on a 6-day per week basis in Anoka County. This daily rate is equivalent to 3372 tons per week or 175,300 tons per year. The total includes residential, commercial

and industrial waste generated within the County, but excludes large scale demolition type debris.

There is a significant variation in seasonal generation rates. The seasonal variation is indicated as follows:

|         |                 |
|---------|-----------------|
| Winter, | 2708 tons/week  |
| Spring, | 4069 tons/week  |
| Summer, | 3543 tons/week  |
| Autumn, | 4293 tons/week. |

The variation may be attributed to substantial increases in home and yard wastes during the traditional spring and fall clean-up periods.

Solid waste reports for 1982 and 1984 indicate the approximate percentage of wastes generated by residences, and commercial and industrial sources in Anoka County. It appears that approximately 60 percent of the solid waste is residential, 15 percent is commercial, and 25 percent is industrial.

Increases in County population and businesses will result in additional solid waste generation. Current projections indicate that the total volume of waste could increase from 562 tons/day in 1985 to 613 tons/day in 1990 and 657 tons/day in the year 2000 (Anoka County Solid Waste Quantity Study, Pope-Reid Associates Dec. 1985). The total annual quantity for 1985 was 175,300 tons, and is expected to increase to 191,278 tons in 1990, and to 205,115 tons in 2000 (ref. Anoka County Solid Waste Quantity Study, Pope-Reid Assoc. Dec. 1985). The estimated landfill filling rate for the period from 1985 through 2000 is expected to be on the order of 217 acre/feet per year increasing to 254 acre/feet (1 acre/foot in a landfill means that one acre of land would be covered with refuse to a thickness of one foot) per year, respectively. The continued use of landfills, at existing and projected rates would consume approximately 3900 acre/feet over a sixteen-year period. The 3900 acre/feet theoretically would accommodate the burial of over 3,000,000 tons of compacted refuse generated by the County.

### 5.3.2 Waste Composition

Although Anoka County has not recently performed a detailed waste composition study, various such reports have been prepared regionally and nationally. They provide a reliable indicator of waste composition.

Table 5.3-1 has been prepared using representative sources to indicate the composition of waste that may be expected in Anoka County. The data sources referenced in developing Table 5.3-1 are as follows

- Compilation of solid waste compositions in 10 cities from 1956 to 1982. "State of the Knowledge Report on the Disposal of Incinerator Ash," by H.G. Rigo, August 1982.
- Study performed by Metcalf & Eddy in 1978 for Lower Pioneer Valley Regional Planning Commission for City of Springfield, Massachusetts and surrounding communities.
- "Draft Environmental Impact Report Waste to Energy Facility, Agawam, Massachusetts, August 1984, prepared by ERT.
- National average, cited in Table IV-b of the Hennepin County Comprehensive Recycling Study, Volume 2, July 1985 indicating that the source is the U.S. EPA 4th report to Congress, Resource Recovery and Waste Reduction, 1977, Table 1, p.14.

An evaluation of Table 5.3-1 indicates that the largest single component of municipal solid waste is paper products averaging about 37 percent of the total. The percentage is comparable to both national and other regional averages. The next largest percentage of waste is classified as "other organics" and averages about 21 percent. The "other organics" category consists of unclassified organic material such as garbage, but not including yard and garden wastes.

Yard and garden wastes nationwide generally account for about 12 percent. However, Hennepin County data indicates a lower volume of nine percent. The remaining components are estimated to be less than 10 percent each and are as follows:

TABLE 5.3-1  
GENERALIZED WASTE COMPOSITION

| <u>Type of Waste</u> | <u>Percent</u> |          |          |          |          | <u>Average</u> |
|----------------------|----------------|----------|----------|----------|----------|----------------|
|                      | <u>A</u>       | <u>B</u> | <u>C</u> | <u>D</u> | <u>E</u> |                |
| Paper, Cardboard     | 41             | 33       | 35       | 32       | 45       | 37             |
| Plastics             | 7              | 4        | 4        | -        | -        | 5              |
| Yard & Garden        | 10             | 19       | 16       | 9        | 8        | 12             |
| Other Organics       | 22             | 17       | 20       | -        | 26       | 21             |
| Aluminum             | 1              | 9        | 10       | 6        | 1        | 6              |
| Magnetics (metal)    | 6              | 9        | -        | -        | 4        | 6              |
| Glass                | 7              | 10       | 11       | 4        | 4        | 7              |
| Fines/Inerts/        |                |          |          |          |          |                |
| Miscellaneous        | 6              | 8        | 2        | -        | 6        | 6              |
| Wood                 | -              | -        | 4        | 8        | 6        | 6              |

Source: ERT, 1986.

Plastics 5%  
Aluminum and magnetics 6%  
Glass 7%  
Fines/inerts/miscellaneous 6%  
Wood 6%

Actual waste composition can vary from community to community depending on the mix of residential, commercial, and industrial users, and seasonal variations. The volume of organics is also dependent upon the length of the growing season.

Based on the estimated volume of 613 tons per day expected to be produced by 1995 in Anoka County, the average waste composition would be as follows:

|                            |              |
|----------------------------|--------------|
| Paper products             | 227 tons/day |
| Other organics             | 129          |
| Yard and garden            | 76           |
| Aluminum and magnetics     | 36           |
| Glass                      | 43           |
| Fines/inerts/miscellaneous | 36           |
| Wood                       | 36           |
| Plastics                   | <u>30</u>    |
| Total                      | 613 Tons/Day |

### 5.3.3 Waste Disposal Facilities

#### 5.3.3.1 Facility Identification and Status

The existing waste disposal options for the County consist of landfills, recycling and composting programs. Table 5.3-2 identifies eight recycling centers. They are located in the municipalities of Fridley, Coon Rapids, Columbia Heights, Anoka and Champlin. These facilities are reported to accept newspaper, phone books, aluminum and steel cans, copper, brass, car batteries, glass, motor oil, and plastic pop bottles.

TABLE 5.3-2  
RECYCLING CENTERS IN ANOKA COUNTY

| <u>Facility I.D.</u>                  | <u>Location</u>  | <u>Wastes Accepted/Remarks</u>                                                                      |
|---------------------------------------|------------------|-----------------------------------------------------------------------------------------------------|
| Fridley Assembly of<br>God Church     | Fridley          | Newspaper                                                                                           |
| Peach Lutheran Church<br>Boy Scouts   | Coor Rapids      | Newspaper                                                                                           |
| St. Timothys Church                   | Columbia Heights | Newspaper, phonebooks                                                                               |
| Grossleir Beverages<br>Inc.           | Anoka            | Aluminum cans                                                                                       |
| Fridley Recycling<br>Center Sort Inc. | Fridley          | Newspaper, aluminum and steel<br>cans, aluminum foil and pans,<br>glass jars and bottles, motor oil |
| U-Can                                 | Fridley          | Aluminum cans, scrap aluminum,<br>bimetal pop cans, glass bottles<br>and jars plastic pop bottles   |

Source: Recycle It! A Directory of Recycling Centers in the Twin Cities Area,  
Metro Council.

Table 5.3-3 identifies three programs for the disposal and recycling of tree and yard waste, and curbside recycling. Table 5.3-4 presents information relative to sanitary landfills which are the final destination of most municipal solid waste. Two commercial landfills, Waste Disposal Eng. and Oak Grove were closed in 1983 and 1984. Approximately 95% of the waste generated in Anoka County currently is placed in three landfills, one of which is located in Sherburne County. The Anoka Municipal Landfill (Waste Management, Inc.) is commercially operated and is scheduled for closure in January 1987. The Anoka landfill operators have made application for additional expansion. The East Bethel commercial landfill accepts only demolition debris, and a limited amount of municipal solid waste which is stored in roll-offs for disposal on a weekly basis. The expected site life for the East Bethel landfill is 5 to 7 years at the 1984 filling rate. The Yonak land fill, in Wright County, has recently been accepting increasing quantities of waste from Hennepin County. Estimated remaining capacity at the Yonak landfill is greater then 5 years. The remaining landfill, in Elk River, is located in Sherburne County and is utilized by Anoka County among others. The expected site life of the Elk River landfill is greater than 5 years.

East Bethel, Anoka and Elk River landfill operators have made proposals to Anoka County to accept RDF residue on a long-term basis. The Anoka sanitary landfill has made application for additional expansion.

The Anoka County Solid Waste Quantity Study, (Anoka County Solid Waste Quantity Study, Pope-Reid Assoc. Dec. 1985 Table 1, Table 1) dated December 1985 indicated that of all municipal solid waste hauled to landfills, 70% was taken to the Waste Management landfill, 15% was delivered to the Elk River landfill, 12% was taken to East Bethel and 3% was disposed of at other landfills not currently identifiable.

Anoka County does not have any licensed hazardous waste storage, treatment, or disposal facilities.

The State Solid Waste Management Act of 1980 and a subsequent amendment in 1985 will have long term impacts on existing and future land disposal facilities. The proposed revisions to MPCA Solid Waste Rules pertaining to landfill design ground water monitoring, financial

TABLE 5.3-3  
MISCELLANEOUS WASTE FACILITIES AND PROGRAMS

| <u>Facility I.D.</u>                                                            | <u>Location</u>            | <u>Wastes Accepted</u>                                      |
|---------------------------------------------------------------------------------|----------------------------|-------------------------------------------------------------|
| *Anoka County Tree Waste Disposal Facility operated by Anoka County Parks Dept. | Bunker Hills Regional Park | Diseased tree waste, (burning & chipping)                   |
| **Anoka County Yard Waste Composting                                            | Coon Rapids                | Yard waste                                                  |
| **City of Fridley Curbside Recycling                                            | Fridley                    | Curbside recycling                                          |
| City of Blaine                                                                  | Blaine                     | Drop off center                                             |
| Centerville                                                                     | Centerville                | Curbside recycling, started Jan. 1986                       |
| Circle-Pines-Lexington                                                          | Circle Pines/ Lexington    | Drop-off center                                             |
| Columbia Heights                                                                | Columbia Heights           | Drop-off, started 1985                                      |
| Coon Rapids                                                                     | Coon Rapids                | Brush, log chipping, office paper recycling                 |
| East Bethel                                                                     | East Bethel                | Drop-off center                                             |
| Fridley                                                                         | Fridley                    | Curbside recycling, started June 1985                       |
| Linolakes                                                                       |                            | Yard waste drop off, 1986                                   |
| Ramsey                                                                          | Ramsey                     | Drop off center                                             |
| Springlake Park                                                                 | Spring Lake Park           | Pilot curbside recycling and drop-off center, to start 1986 |

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\*Anoka County Solid & Hazardous Waste, Current Solid Waste Situation, 1982.

\*\*Anoka County Waste to Energy Project Waste Designation Plan

TABLE 5.3-4  
STATUS OF LANDFILLS

| <u>Facility</u>                                                   | <u>Ownership</u> | <u>Annual<br/>Volume Received</u> | <u>Remaining<br/>Capacity</u> | <u>Approximate<br/>Site Life</u> | <u>Status</u>                                                                                                                        |
|-------------------------------------------------------------------|------------------|-----------------------------------|-------------------------------|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| Anoka Municipal SLF<br>(operated by Waste<br>Management of Minn.) | Commercial       | 1,216,303 cy.<br>(1984)           | 1,103,300 c.y.                | 1 year                           | Closure due Jan 1987<br>RI/FS in progress, environmental<br>problems suspected. Operator has<br>made requests for landfill expansion |
| East Bethel SLF                                                   | Commercial       | 156,713 cy.<br>(1984)             | 1,113,000 c.y.                | 5-7 years                        | Open for demolition, & limited<br>municipal waste. RI/FS in<br>progress, environmental problems<br>suspected                         |
| Elk River SLF<br>(Sherburn County)                                | Commercial       | 537,302 cy.<br>(1984)             |                               | 5+ years                         | Preliminary discussions for 40<br>acre expansion no plans at present<br><br>Site is on 1986 Minn. superfund<br>list.                 |
| Waste Disposal Eng. SLF                                           | Commercial       | 218,219 cy.<br>(1982)             | 0                             | 0                                | Closed 1983                                                                                                                          |
| Oak Grove SLF                                                     | Commercial       | 203,550 cy.<br>(1983)             | 0                             | 0                                | closed 1984                                                                                                                          |
| Yonack SLF<br>(Wright County)                                     |                  | 14,655 cy<br>(1984)               |                               | 5+ years                         |                                                                                                                                      |

Notes:

- 1) Anoka sanitary landfill has requested additional expansion.
- 2) The landfills mentioned above (with the exception of Anoka) will have expanded into additional cells having liners and leachate collection systems by the time the RDF Facility is operational.

responsibility and closure will likely have substantial impacts as well. The implementation of this Act has and will result in less land disposal. However, waste volumes have and are expected to increase due to population and development pressures. The need for safe long term disposal facilities other than landfills has significantly increased.

In Anoka County, two of the four landfills have closed. The Anoka municipal landfill has about one year of operation before closure. The East Bethel landfill has a site life on the order of 5 to 7 years. Landfills outside of the County especially that in Elk River are also being utilized to dispose of wastes.

A variety of environmental, social, and economic factors have resulted in the current reliance on landfills. In addition to the rapid filling of the landfills, landfill expansion or development of new landfills is severely restricted by environmental controls, state regulation and public opposition. Typically, currently operating landfills have a high potential for ground and water resource contamination, which increases with the increase in waste volume at the site. The continuing use of land for filling with refuse consumes a resource that may be useful for other beneficial purposes. The largest single environmental impact of continued use of landfills (without a substantial reduction in volume) is linked to the adverse impact of landfill leachate on soil, ground and surface water resources. Even though new secure landfills are designed to minimize leachate potential, existing landfills will generate varying amounts of leachate.

The Anoka Municipal and East Bethel landfills have suspected ground water contamination conditions, and are currently being investigated. Remedial Investigation/Feasibility Studies (RI/FSs) are in progress. The Elk River landfill has been included on the 1986 Minnesota Superfund list, and is also subject to site investigation.

The MPCA is currently reviewing all landfill permits in force to determine whether upgrading may be necessary. As part of this upgrade review, hydrological conditions and facility design are being evaluated. Permit conditions, including design of the given facilities, could be modified.

The reduced number of open landfilling areas, suspected environmental problems, and limited site capacity indicate that needed

landfill space for resource recovery wastes on a long term basis is very limited.

Permits for new landfill facilities, including expansion permits for existing landfills, will include requirements for liners and leachate collection, ground water monitoring, closure provisions and post closure maintenance. It is anticipated that costs of landfilling waste will increase substantially in the future.

#### 5.3.3.2 Regional Landfill Availability (Metropolitan Area)

The Metropolitan Council's solid waste guide provides information on landfill space availability in the seven-county region. Table 5.1-2 shows the capacities, use rate and approximate closure dates for landfills in the region. The remaining capacity of 11,909 acre-feet, as of January 1985, is being used up at to rate of 1,710 acre-feet per year. The regional landfill system is estimated to have capacity until 1991-1993 (Metropolitan Council, 1985a).

The Flying Cloud and Freeway landfills have applied for expansion permits of 5,644 and 1,860 acre-feet, respectively. The expansion permits are still pending approval. Both landfills are on the state's list of priority sites (Superfund List), and remedial investigation and feasibility studies will have to be done by the owners under consent agreements with the MPCA. In September 1985, the MPCA granted Flying Cloud Landfill an interim expansion permit for 500 acre-feet.

Hennepin County is in the process of preparing an environmental impact statement on four candidate landfill sites. The sites were located and approved in accordance with the landfill siting requirements of the WMA. The Council's solid waste guide requires the county to develop one new landfill with at least 3,232 acre-feet capacity. The guide calls for the site to be operational in 1991. Expansions of existing landfills may substitute for this capacity requirement (Metropolitan Council, 1985a). Another county is in the process of preparing an EIS on three landfill inventory sites, as required by the WMA and the Council guide. Inventory sites are located in Oak Grace Township, the City of Ramsey, and the Cities of Andover

and Coon Rapids. The Council's solid waste guide requires the county to develop one new landfill with a capacity of 3000 acre-feet, to be developed in the late 1980's.

Major resource recovery projects are being developed in counties adjacent to Anoka County. The farthest along is the refuse-derived fuel (RDF) facility being developed by the Northern States Power Co. (NSP) for Ramsey and Washington Counties. This project is a 1,000 ton-per-day facility and will be located in Newport. RDF will be taken to NSP's power plant in Red Wing. The two counties are imposing waste flow designation to supply waste to the Newport facility. The Metropolitan Council has approved a designation plan and ordinance for the project, and NSP has secured the necessary permits and approvals. The project broke ground in July 1985 and is expected to be operational in 1987 (Alders, 1985).

#### 5.4 Land Use and Zoning

##### 5.4.1 Land Use

The site is located on 165th Street just east of U.S. Route 10 in Elk River in Sherburne County. It is adjacent to the LeFebvre & Sons, Inc. Mobil station situated on the corner of 165th Street and U.S. Route 10. The nearest residences are a home located about 1/4 mile east of the facility and a residence approximately 1/4 mile northwest of the site.

Land uses within one mile of the proposed facility are varied. To the east there are primarily agricultural and related land uses. The Nutrena Research Farm is east of the proposed plant, where farming, grazing and other agricultural research is conducted. The Burlington Northern Railroad right-of-way is near the eastern boundary of the site.

To the south of the site, along U.S. Route 10, are several residences and commercial highway businesses. Some agricultural activity was also observed. The Anoka County line is located approximately two miles to the southeast.

To the immediate west of the site is the previously mentioned LeFebvre & Sons, Inc. garage and a Mobil station. West of U.S. Route 10 are primarily agricultural land uses that give way to floodplain and the Mississippi River further to the west. West of the river is Otsego Township in Wright County. The nearest land uses in Otsego Township are a trailer court, some residences, and related agricultural activity.

The land uses north of the site also vary. Along U.S. Route 10 there are a number of commercial highway related business uses. These include restaurants, an automobile dealership, gasoline service station, and other commercial/retail establishments. Agricultural and related uses are also located within one mile north of the plant site.

The developed portion of the City of Elk River is located approximately two miles north and northwest of the site. Located along U.S. Route 10 and Main Street in Elk River is the Central Business District. The many commercial and business uses here include a drug store, hardware store, automotive parts store, restaurants and gasoline service stations. To the east of the Central Business District there are high and low density residential uses. A rail line also passes east of the business district.

#### 5.4.2 Zoning

The proposed site is currently zoned I-1 Light Industrial District. Uses permitted in an I-1 district are:

- Offices
- Enclosed storage and warehousing
- Research laboratories
- Light manufacturing, including compounding, processing and packaging of products and materials
- Screened outdoor storage areas, and
- Truck terminals.

The project as proposed is not an expressly permitted use in an I-1 district. Certain conditional uses, however, are allowed in Industrial Districts. They include:

- Junkyards and automobile wrecking and storage yards
- Waste transfer and reduction facilities
- Extraction and asphalt processing operations
- Rendering plants
- Uses similar to the above identified uses
- Broadcasting studios and facilities
- Airports, and
- Certain single family dwelling units.

Application for conditional use permits for the project are to be filed with the Building and Zoning Administrator, for review by the Planning Commission. The Planning Commission can impose limitations on a conditional.

Certain dimensional limitations are applicable to uses in an I-1 Light Industrial District. The minimum lot size required is one acre. The setback requirements are 50 feet, 25 feet, and 20 feet for front, side, and rear yards, respectively. The maximum height is to be no more than 40 feet for the principal use. Certain exceptions to the height limitation are provided for sloping, penthouses and stacks. (Zoning Ordinance of the City of Elk River, Effective 1980).

The zoning ordinance requires proper buffering of industrial uses from residential uses. The buffering includes the use of solid walls or screen plantings of an appropriate type (Zoning Ordinance of the City of Elk River, p.144). No harmful odors, light or noise shall be detectable beyond the limits of the site. Performance standards are also provided for other potential nuisances such as vibration, smoke, dust, fumes, fires, air pollution, waste, erosion, and radioactivity.

## 5.5 Transportation

### 5.5.1 Roadway Description

The site for the proposed resource recovery facility is located immediately north of 165th Street and east of U.S. Route 10/169. U.S. Route 10/169 (commonly called T.H. 10) in the vicinity of the proposed site is a four-lane, median divided highway with a posted speed limit

of 55 miles per hour. Paved breakdown lanes exist on much of U.S. Route 10/169. The roadway flares at several intersections for separate right and left turn lanes. U.S. Route 10/169 is a major carrier of traffic in the site area, and has a general north to south configuration.

In front of the site, 165th Street is a rural two-lane roadway with no posted speed limit. It intersects with U.S. Route 10/169 to the southwest of the site. This intersection is unsignalized with right and left turn lanes on U.S. Route 10/169 northbound and southbound. 165th Street has a general west to east configuration.

U.S. Route 10/169 continues to the north of the site and then intersects with State Route 101. At this point it separates into U.S. Routes 169 and 10. This interchange is grade separated and consists of highway on and off ramps. U.S. Route 10 continues to the northwest where the first intersection is with the access road to the UPA power plant followed by the intersection with Main Street at the beginning of the Elk River business district. The intersection of U.S. Route 10 and the UPA power plant access road currently operates under stop sign control, with a separate turn lane on U.S. Route 10 for access into the UPA power plant. The access road at this intersection is a three-lane cross section, one lane entering, one lane for right exiting turns, and one lane for left turns exiting onto U.S. Route 10. The speed limit on U.S. Route 10 at the UPA plant access road is 55 miles per hour.

The intersection of U.S. Route 10 and Main Street functions as a three-phase signalized intersection. A left turn phase exists for vehicles on U.S. Route 10 northbound and southbound. Main Street is a two-lane roadway that runs through the center of the City of Elk River. Main Street has a general west to east configuration near its intersection with U.S. Route 10.

The pavement surfaces on the roadways previously described consist of bituminous asphalt and were observed to be in good condition. Lane widths were generally 12 feet. Horizontal or vertical obstructions were not noted. Table 5.5-1 summarizes the checklist used in the field inventory of roadway geometrics and traffic control (February 18, 1986).

TABLE 5.5-1  
FIELD INVENTORY ITEMS  
SITE ACCESS ROADWAY SYSTEM GEOMETRICS AND TRAFFIC CONTROL

I. Geometrics

1. Width
2. Curbing
3. Shoulders
4. Radii
5. Approach Angles
6. Lane Use

II. Controls

1. Parking Restrictions
2. Signing
3. Pavement Markings
4. Bus Stops
5. Loading Zones
6. Traffic Signals
7. Speed Limits

III. Safety

1. Stopping Sight Distance
2. Horizontal Alignment
3. Vertical Alignment
4. Lateral Obstructions
5. Illumination
6. Approach Speeds
7. Weight Limits
8. Pavement Condition

---

Source: ERT, 1986

### 5.5.2 1986 Baseline Traffic Volumes

Baseline (1986) traffic demand information for the site access roadway system was obtained through completion of both automatic traffic recorder (ATR) counts and manual turning movement counts (TMCs). The automatic traffic recorder machine counts were collected to determine the temporal distribution of weekday traffic flow. The machines record traffic volumes every fifteen minutes for a period of 24 hours or more and print the data on a readable tape. The automatic counts were taken on U.S. Route 10/169 near the proposed resource recovery facility site, and on U.S. Route 10 at the UPA power plant. Figure 5.5-1 shows the locations of the automatic machine counts.

Manual turning movement counts were taken at key locations where facility generated traffic could potentially concentrate while accessing and egressing the site. The manual counts were taken during the AM and PM commuter peak period which represents worst-case traffic flow conditions.

The 24-hour counts were reviewed to determine the temporal distribution for traffic volumes. In conjunction with a review of the turning movement data, the peak hour of traffic volumes was selected. The locations of the turning movement counts were as follows:

- U.S. Route 10 at Main Street
- U.S. Route 10 at UPA Power Plant Access Road
- U.S. Route 10 at U.S. Route 169 at State Route 101
- U.S. Route 10/169 at 165th Street

Figure 5.5-1 also shows the locations of the manual turning movement counts. The existing, 1986, traffic turning movement counts are shown on Figures 5.5-2 and 5.5-3 for the AM (7:30-8:30 AM) and PM (4:00-5:00 PM) peak hours, respectively. The 24-hour machine counts are presented in Figure 5.5-4.

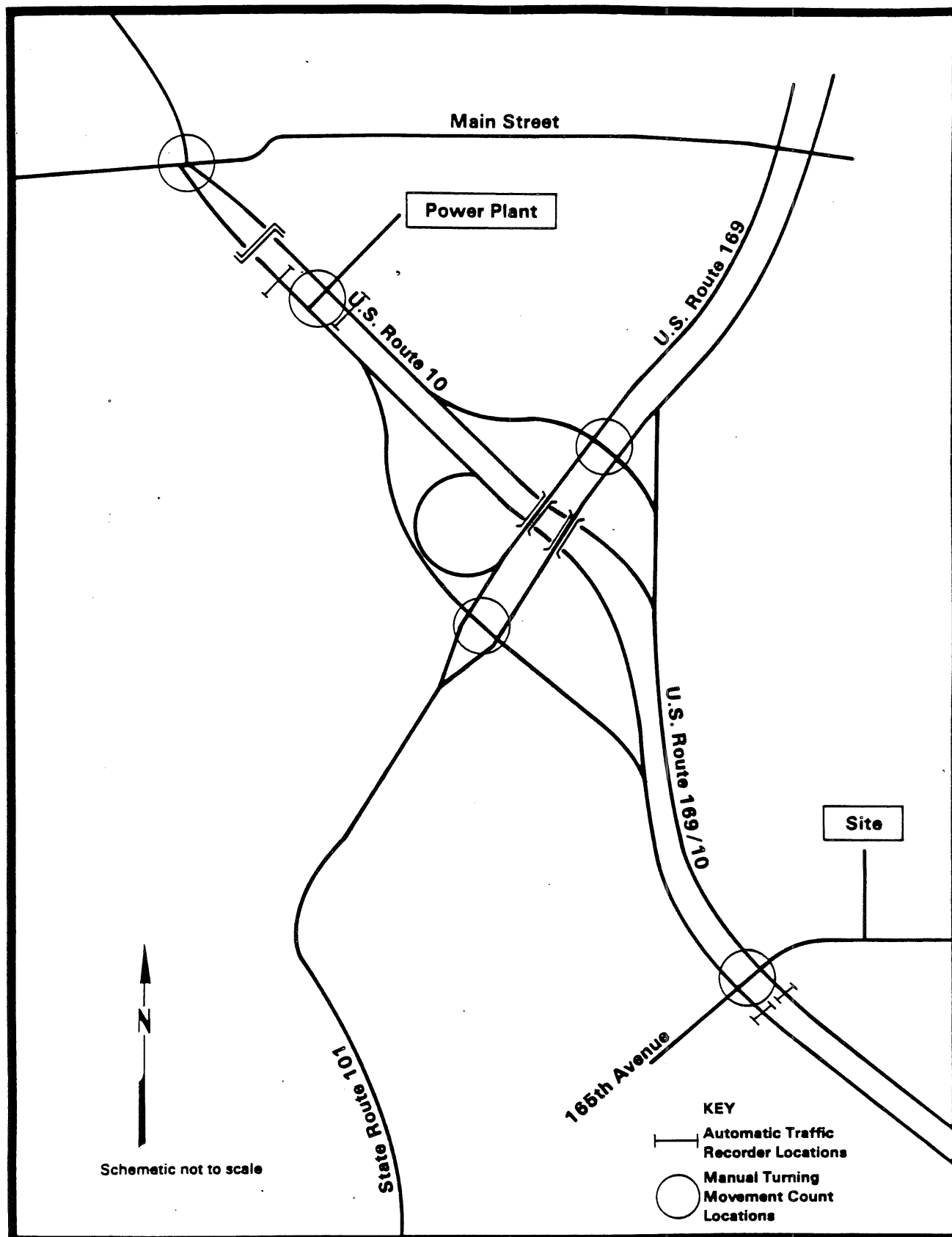


Figure 5.5-1 Field Data Collection Activities

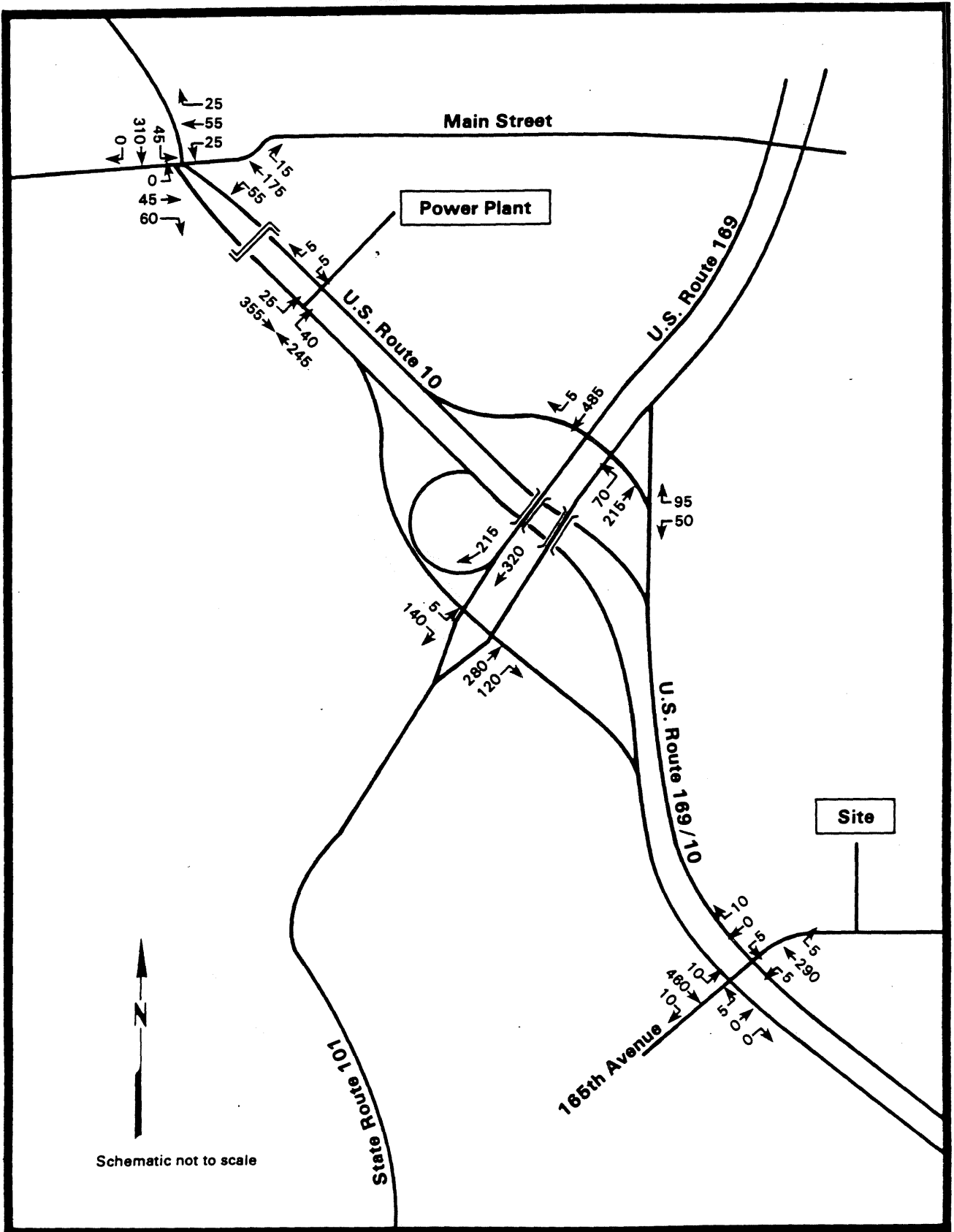


Figure 5.5-2 1986 A.M. Peak Hour (7:30-8:30 A.M.)

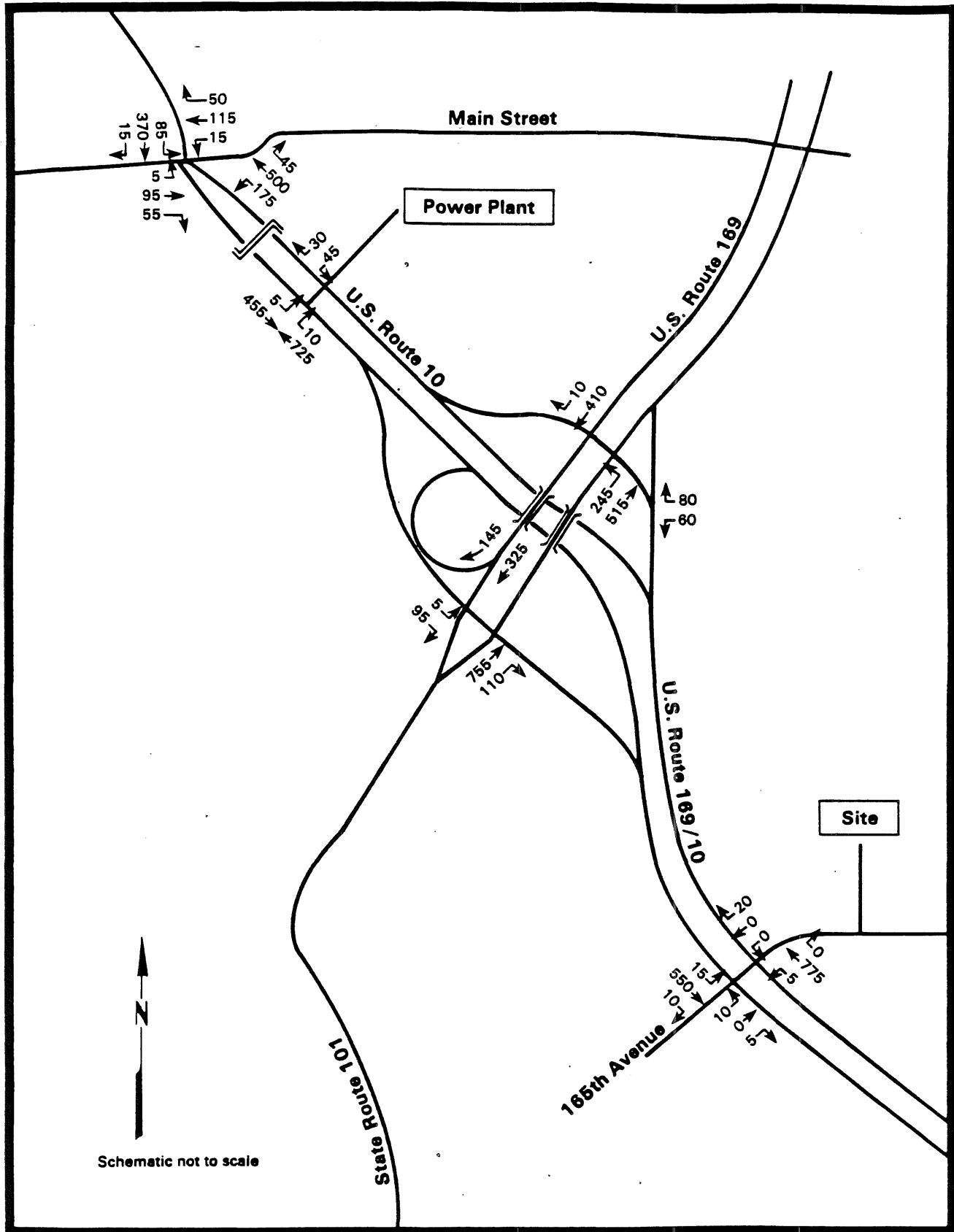


Figure 5.5-3 1986 P.M. Peak Hour (4:00-5:00 P.M.)

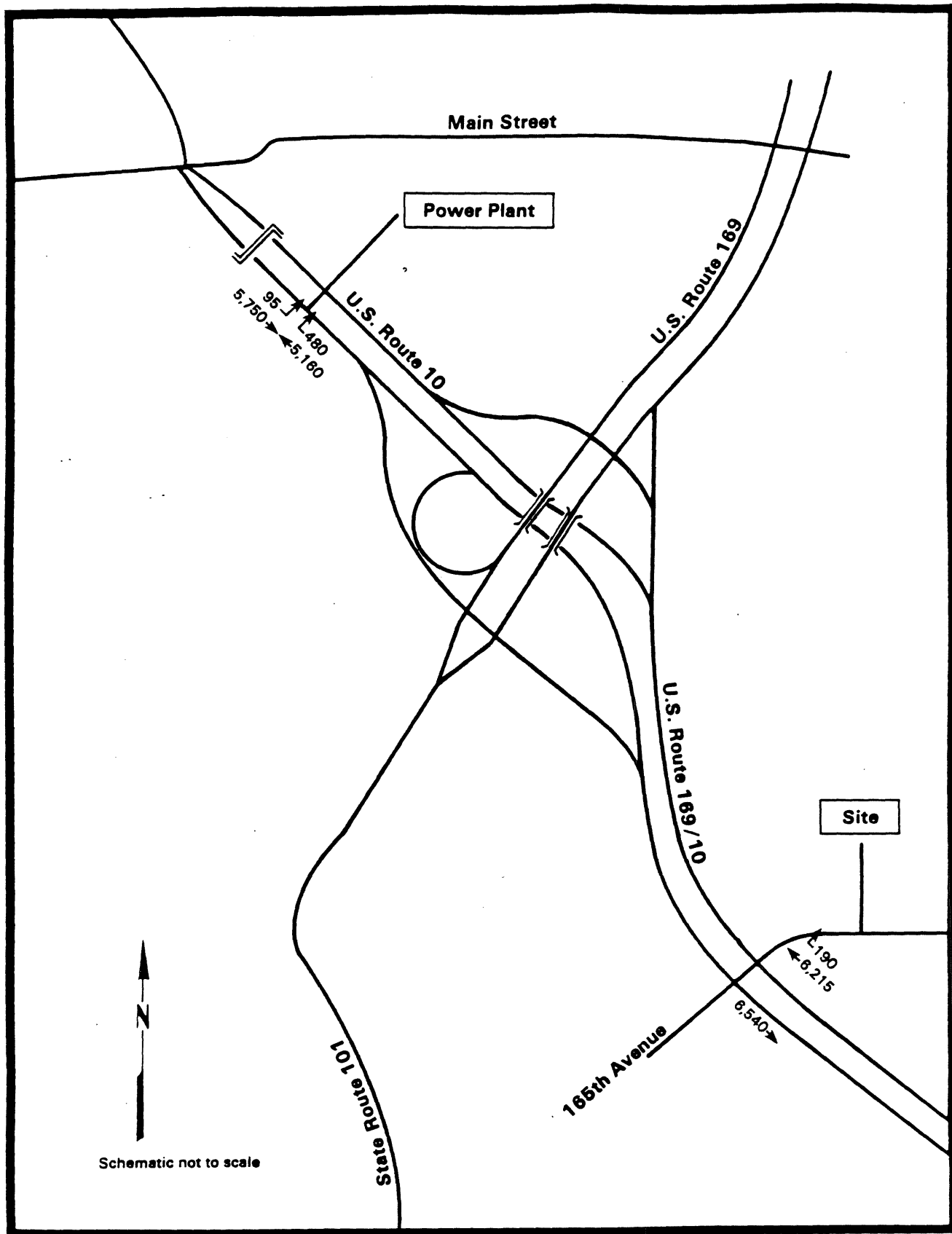


Figure 5.5-4 24-Hour Traffic Totals

### 5.5.3 Intersection Capacity Analyses

Points of vehicular conflict generally govern the efficiency of a roadway network. Such points include intersections, highway on and off ramps, and traffic circles.

Intersection capacity analyses were performed using the AM and PM commuter peak hour traffic demands to determine the existing level of traffic flow efficiency on site access roadways.

The capacity analysis for an intersection measures the operating characteristics of the location and is based on physical conditions, vehicular volumes and prevailing traffic control. Measures of the quality of traffic flow are expressed by letter designations called Levels of Service (LOS). Levels of Service range from Level "A" with stable free flow to Level "E" which is capacity at unstable flow, or the maximum amount of traffic which can be accommodated at the intersection. Conditions exceeding capacity are designated LOS "F". At this level, traffic flow is forced, resulting in congestion and frequent delays. Table 5.5-2 describes the traffic operating characteristics - Level of Service relationships for intersections. In general, a Level of Service "C" stable flow condition is the desired traffic operating standard.

Using procedures defined in the 1985 Highway Capacity Manual (Transportation Research Board Special Report 209, Highway Capacity Manual, 1985) and the Transportation Research Board Circular Number 212, Transportation Research Board, Circular Number 212, Interim Materials on Highway Capacity, 1980) capacity analyses were performed for the following intersection areas.

- U.S. Route 10 at Main Street
- U.S. Route 10 at UPA Power Plant Access Road
- U.S. Route 10 at U.S. Route 169 and State Route 101 (North)
- U.S. Route 10 at U.S. Route 169 and State Route 101 (South)
- U.S. Route 10/169 at 165th Street.

The results of the capacity analyses are summarized in Table 5.5-3. The key intersection areas through which solid waste trucks would pass are currently operating at LOS "B" condition or better.

TABLE 5.5-2  
LEVEL OF SERVICE DESCRIPTIONS  
FOR SIGNALIZED AND UNSIGNALIZED INTERSECTIONS

| <u>Level of Service</u>            | <u>Operating Characteristics</u>                                                     |
|------------------------------------|--------------------------------------------------------------------------------------|
| <b>Signalized Intersections:</b>   |                                                                                      |
| A                                  | Little or no delay. Excellent operation                                              |
| B                                  | Short traffic delays. No waiting through signal cycles. Very good operation.         |
| C*                                 | Average traffic delays. No waiting through signal cycles. Good operation.            |
| D                                  | Long traffic delays. Occasional waiting through more than one cycle. Fair operation. |
| E                                  | Very long traffic delays. Delays up to several signal cycles. Poor operation.        |
| F                                  | Jammed conditions. Backups may block other intersections. Force flow.                |
| <b>Unsignalized Intersections:</b> |                                                                                      |
| A                                  | Little or no delay.                                                                  |
| B                                  | Short traffic delays.                                                                |
| C*                                 | Average traffic delays.                                                              |
| D                                  | Long traffic delays.                                                                 |
| E                                  | Very long traffic delays                                                             |
| F                                  | Failure - extreme congestion                                                         |

---

Source: Transportation Research Circular; Number 212, January, 1980.

\*LOS "C" is the accepted operating condition for both signalized and unsignalized intersections.

TABLE 5.5-3  
1986 EXISTING LEVELS OF SERVICE

| <u>Intersection</u>                                            | Level of Service |           |
|----------------------------------------------------------------|------------------|-----------|
|                                                                | <u>AM</u>        | <u>PM</u> |
| Main Street and<br>U.S. Route 10                               | A                | B         |
| U.S. Route 10 and<br>Power Plant Access Road                   | A                | B         |
| U.S. Route 10 at U.S. Route<br>169 and State Route 101 (North) | B                | B         |
| U.S. Route 10 at U.S. Route<br>169 and State Route 101 (South) | A                | A         |
| U.S. Route 169/10 and<br>165th Avenue                          | A                | A         |

#### 5.5.4 Safety Concerns

Safe operation of roadways and intersections requires that several conditions be satisfied. Adequate sight distance must exist on all roads to provide time for drivers of approaching vehicles to decide to proceed with merging or diverging maneuvers. In addition, safe operation requires the existence of sufficient gaps in vehicle traffic on roadways so that vehicles entering the traffic flow can do so safely. Also, an intersection should be controlled in the proper fashion, either signalized, or unsignalized in order to ensure safe operations.

Safe operation on a roadway requires that there be adequate sight distance for merging operations onto the major roadway. Sight distance is a function of stopping time; which consists of both perception and reaction time. Minimum and desirable sight distances are provided in the Transportation and Traffic Engineering Handbook, Institute of Traffic Engineers, and are a function of vehicular velocity, perception time, and pavement conditions. (Institute of Traffic Engineers, Transportation and Engineering Handbook, 1976).

The posted speed limit on U.S. Route 10 by the UPA power plant access road, and also near its intersection with 165th Street, is 55 mph. Entering and exiting sight distances at these two intersections are greater than 600 feet in both directions. Entering and exiting sight distances at the intersection of U.S. Route 169, U.S. Route 10, and State Route 101 are greater than 500 feet in both directions. (Posted speed limit is 45 mph at this interchange).

The desirable stopping sight distances as reported in the Transportation and Traffic Engineering Handbook for speeds of 55 mph and 45 mph are 550 feet and 450 feet, respectively. The observed sight distances are within those recommended in the Handbook.

Safe operation of an intersection is also a function of the vehicular demand through that intersection. Traffic signals when warranted by large traffic volumes should be placed at an intersection. If demand volumes are not sufficiently high, a traffic signal is not warranted.

The Manual on Uniform Traffic Control Devices (U.S. Department of Transportation, Federal Highway Administration, Manual on Uniform Traffic Control Devices, 1978) recently updated, describes several of the traffic signalization warrants. If a warrant is met, a traffic signal should be placed at the intersection. If not met, a traffic signal is not warranted at the intersection. The current traffic volumes at the key intersections analyzed do not warrant the installation of traffic signals.

Using accident data from the Minnesota Department of Transportation, the following intersection areas were analyzed:

- U.S. Route 10 at U.S. Route 169/State Route 101 Interchange
- U.S. Route 169/State Route 101 at U.S. Route 10 Interchange
- U.S. Route 10 at Main Street
- U.S. Route 10 at 165th Street.

Accident statistics were obtained for a period of six years (1/1/80-12/31/85). There were a total of 137 accidents during that period of which 54 resulted in some type of injury. There were no fatalities reported.

The majority of accidents reported were collisions between two or more vehicles (95); followed by collisions with fixed objects (22); and other accidents (18). There were only two accidents involving a pedestrian. Table 5.5-4 presents the accident data by location, and Table 5.5-5 shows the total number of accidents per year.

Figure 5.5-5 shows that the number of accidents in the project area remained relatively constant from 1980 through 1984, but has increased during 1985. The lowest number of accidents occurred during 1980 and 1983 (18), while the highest number of accidents occurred during 1985 (30).

## 5.6 Noise

To characterize the noise environment in a community, it is necessary to identify noise-sensitive receptors, noise sources and noise propagation features, and to measure noise levels.

TABLE 5.5-4  
ACCIDENT STATISTICS ON HIGHWAY LOCATION

| <u>Intersection</u> | <u>Year</u> | <u>Accident Type</u> |                     |                   |              |
|---------------------|-------------|----------------------|---------------------|-------------------|--------------|
|                     |             | <u>Other Vehicle</u> | <u>Fixed Object</u> | <u>Pedestrian</u> | <u>Other</u> |
| U.S. Route 10 at    | 1980        | 5                    | 2                   | 1                 | 1            |
| U.S. Route 169/     | 1981        | 2                    | 1                   | 0                 | 6            |
| State Route 101     | 1982        | 8                    | 3                   | 0                 | 1            |
| Interchange         | 1983        | 2                    | 2                   | 0                 | 1            |
|                     | 1984        | 4                    | 0                   | 0                 | 2            |
|                     | 1985        | 4                    | 3                   | 0                 | 4            |
| U.S. Route 169/     | 1980        | 1                    | 1                   | 0                 | 0            |
| State Route 101 at  | 1981        | 0                    | 2                   | 0                 | 1            |
| U.S. Route 10       | 1982        | 1                    | 2                   | 0                 | 0            |
| Interchange         | 1983        | 3                    | 0                   | 0                 | 0            |
|                     | 1984        | 7                    | 2                   | 0                 | 1            |
|                     | 1985        | 13                   | 2                   | 0                 | 0            |
| U.S. Route 10       | 1980        | 5                    | 0                   | 1                 | 0            |
| at Main Street      | 1981        | 12                   | 0                   | 0                 | 0            |
|                     | 1982        | 8                    | 1                   | 0                 | 0            |
|                     | 1983        | 9                    | 0                   | 0                 | 0            |
|                     | 1984        | 6                    | 0                   | 0                 | 0            |
|                     | 1985        | 3                    | 1                   | 0                 | 0            |
| U.S. Route 10       | 1980        | 1                    | 0                   | 0                 | 0            |
| at 165th Street     | 1981        | 0                    | 0                   | 0                 | 1            |
|                     | 1982        | 0                    | 0                   | 0                 | 0            |
|                     | 1983        | 1                    | 0                   | 0                 | 0            |
|                     | 1984        | 0                    | 0                   | 0                 | 0            |
|                     | 1985        | 0                    | 0                   | 0                 | 0            |

TABLE 5.5-5  
ACCIDENT STATISTICS FOR SIX-YEAR PERIOD  
(1980-1985) IN SITE AREA

| <u>Location</u>                                                       | <u>Type</u>                                                             | <u>Injury</u> | <u>Fatality</u> |
|-----------------------------------------------------------------------|-------------------------------------------------------------------------|---------------|-----------------|
| U.S. Route 10<br>at U.S. Route 169/<br>State Route 101<br>Interchange | 25 - Other Vehicle<br>11 - Fixed Object<br>1 - Pedestrian<br>15 - Other | 22            | 0               |
| U.S. Route 169/<br>State Route 101 at<br>U.S. Route 10<br>Interchange | 25 - Other Vehicle<br>9 - Fixed Object<br>0 - Pedestrian<br>2 - Other   | 14            | 0               |
| U.S. Route 10<br>at Main Street                                       | 43 - Other Vehicle<br>2 - Fixed Object<br>1 - Pedestrian<br>0 - Other   | 16            | 0               |
| U.S. Route 10<br>at 165th Street                                      | 2 - Other Vehicle<br>0 - Fixed Object<br>0 - Pedestrian<br>1 - Other    | 2             | 0               |
| TOTALS                                                                | <u>137</u>                                                              | <u>54</u>     | <u>0</u>        |

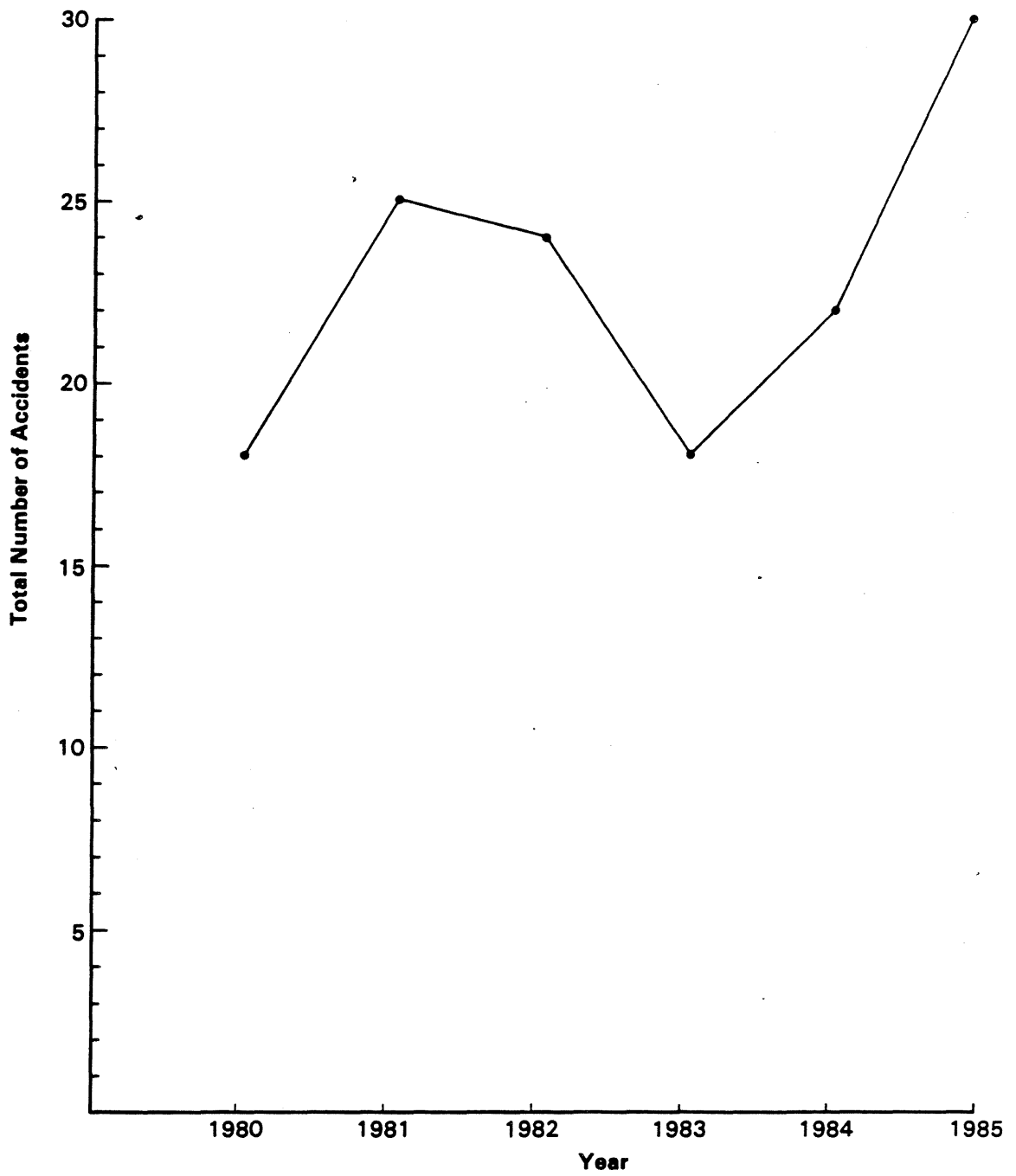


Figure 5.5-5 Total Number of Accidents per Year at All Locations Analyzed

Noise-sensitive receptors are existing homes or buildings or land uses where people could be adversely affected by noise from the proposed project.

Noise data for the areas of the proposed resource recovery facility and the UPA power plant were collected during the week of February 17-21, 1986 by ERT.

The measurement locations were selected to provide angular coverage about the proposed project sites with emphasis on proximity to noise sensitive receptors. The instrumentation used by ERT consisted of a Vibro-meter Model 614 Noise Monitoring System and one-half inch GenRad microphone. Measurements were taken at various times of day and night to obtain a total description of the noise environments in the potentially affected neighborhoods.

#### Noise Standards

There are no federal noise regulations that apply to the operation of resource recovery facilities or transfer stations. Thus, only state regulations and local ordinances apply to the proposed project.

#### MPCA Noise Standards

Table 5.6-1 presents the current noise standards as established by the Minnesota Pollution Control Agency (MPCA) (Minn. Rules, Chapter 7010.0400, 1983). These standards describe the limiting levels of sound established to preserve public health and welfare. Acceptable sound pressure levels (dBA) vary according to three factors:

- The time of day. Night standards (10 PM to 7 AM) are more stringent than daytime standards (7 AM to 10 PM).
- The land use activity in the receiving area. Land uses are divided into four noise area classifications (NACs): NAC-1, NAC-2, NAC-3, and NAC-4. The land uses in each class are listed in Tables 5.6-2 through 5.6-5 (Minn. Rules, Chapter 7010.0500, 1983). Uses most sensitive to noise are classified as NAC-1 (typically residential in nature) and have the most stringent noise standards.

TABLE 5.6-1  
MINNESOTA POLLUTION CONTROL AGENCY  
NOISE STANDARDS (DAY AND NIGHT)

| Noise Area<br>Classification<br><u>(NAC)</u> | <u>A-Weighted Pressure Levels (dBA)</u> |                 |                   |                 |
|----------------------------------------------|-----------------------------------------|-----------------|-------------------|-----------------|
|                                              | Day (0700-2200)                         |                 | Night (2200-0700) |                 |
|                                              | L <sub>50</sub>                         | L <sub>10</sub> | L <sub>50</sub>   | L <sub>10</sub> |
| 1                                            | 60                                      | 65              | 50                | 55              |
| 2                                            | 65                                      | 70              | 65                | 70              |
| 3                                            | 75                                      | 80              | 75                | 80              |
| 4 <sup>1</sup>                               | --                                      | --              | --                | --              |

<sup>1</sup>No standards are specified for NAC 4.

Source: Minnesota Rules, Chapter 7010.0400, 1983.

TABLE 5.6-2  
LAND USE ACTIVITIES IN NOISE AREA CLASSIFICATION-1 (NAC-1)

| SLUCM       |                                                                                   |
|-------------|-----------------------------------------------------------------------------------|
| Numerical   |                                                                                   |
| <u>Code</u> | <u>Land Activity</u>                                                              |
| 11          | Household units (includes farm houses)                                            |
| 12          | Group quarters                                                                    |
| 13          | Residential hotels                                                                |
| 14          | Mobile home parks or courts                                                       |
| 15          | Transient lodgings                                                                |
| 19          | Other residential not elsewhere coded                                             |
| 397         | Motion picture production                                                         |
| 651         | Medical and other health services                                                 |
| 674         | Correctional institutions                                                         |
| 68          | Educational services                                                              |
| 691         | Religious activities                                                              |
| 71          | Cultural activities and nature exhibitions                                        |
| 721         | Entertainment assembly                                                            |
| 7491        | Camping and picnicking areas (designated)                                         |
| 75          | Resorts and group camps                                                           |
| 79          | Other cultural, entertainment, and recreational<br>activities not elsewhere coded |

<sup>1</sup>These SLUCM codes for land use activities are designated in the  
Standard Land Use Coding Manual (U.S. Government Printing Office, 1969).

TABLE 5.6-3  
LAND USE ACTIVITIES IN NOISE AREA CLASSIFICATION-2 (NAC-2)

| SLUCM       |                                                                   |
|-------------|-------------------------------------------------------------------|
| Numerical   |                                                                   |
| <u>Code</u> | <u>Land Activity</u>                                              |
| 4113        | Railroad terminals (passenger)                                    |
| 4115        | Railroad terminals (passenger and freight)                        |
| 4122        | Rapid rail transit and street railway passenger terminals         |
| 4211        | Bus passenger terminals (intercity)                               |
| 4212        | Bus passenger terminals (local)                                   |
| 4213        | Bus passenger terminals (intercity and local)                     |
| 429         | Other motor vehicle transportation facilities not elsewhere coded |
| 4312        | Airport and flying field terminals (passenger)                    |
| 4314        | Airport and flying field terminals (passenger and freight)        |
| 4411        | Marine terminals (passenger)                                      |
| 4413        | Marine terminals (passenger and freight)                          |
| 46          | Automobile parking                                                |
| 4721        | Telegraph message centers                                         |
| 492         | Transportation services and arrangements                          |
| 51          | Wholesale trade                                                   |
| 52          | Retail trade--building materials, hardware, and farm equipment    |
| 53          | Retail trade--general merchandise                                 |
| 54          | Retail trade--food                                                |
| 55          | Retail trade--automotive, marine craft, aircraft, and accessories |
| 56          | Retail trade--apparel and accessories                             |
| 57          | Retail trade--furniture, home furnishings, and equipment          |
| 58          | Retail trade--eating and drinking                                 |
| 59          | Other retail trade not elsewhere coded                            |
| 61          | Finance, insurance, and real estate services                      |
| 62          | Personal services                                                 |
| 63          | Business services                                                 |
| 64          | Repair services                                                   |
| 652         | Legal services                                                    |
| 659         | Other professional services not elsewhere coded                   |
| 66          | Contract construction services                                    |
| 67          | Governmental services (except 674)                                |
| 69          | Miscellaneous services (except 691)                               |
| 72          | Public assembly (except 721, 7223)                                |
| 73          | Amusements (except 731)                                           |
| 74          | Recreational activities (except 7491)                             |
| 76          | Parks                                                             |

<sup>1</sup>These SLUCM codes for land activities are designated in the Standard Land Use Coding Manual (U.S. Government Printing Office, 1969).

NOTE: Land uses in this category are typically commercial or institutional.

TABLE 5.6-4  
LAND USE ACTIVITIES IN NOISE AREA CLASSIFICATION-3 (NAC-3)

| SLUCM<br>Numerical<br>Code | Land Activity                                                                                                                |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------|
| 21                         | Food and Kindred products--manufacturing                                                                                     |
| 22                         | Textile mill products--manufacturing                                                                                         |
| 23                         | Apparel and other finished products made from fabrics, leather, and similar materials--manufacturing                         |
| 24                         | Lumber and wood products (except furniture)--manufacturing                                                                   |
| 25                         | Furniture and fixtures--manufacturing                                                                                        |
| 26                         | Paper and allied products--manufacturing                                                                                     |
| 27                         | Printing, publishing, and allied industries                                                                                  |
| 28                         | Chemicals and allied products--manufacturing                                                                                 |
| 29                         | Petroleum refining and related industries                                                                                    |
| 31                         | Rubber and miscellaneous plastic products--manufacturing                                                                     |
| 32                         | Stone, clay, and glass products---manufacturing                                                                              |
| 33                         | Primary metal industries                                                                                                     |
| 34                         | Fabricated metal products--manufacturing                                                                                     |
| 35                         | Professional, scientific, and controlling instruments; photographic and optical goods; watches and clocks--manufacturing     |
| 39                         | Miscellaneous manufacturing not elsewhere coded (except 397)                                                                 |
| 41                         | Railroad, rapid rail transit, and street railway transportation (except 4113, 4115, 4122)                                    |
| 42                         | Motor vehicle transportation (except 4211, 4212, 4213, 429)                                                                  |
| 43                         | Aircraft transportation (except 4312, 4314)                                                                                  |
| 44                         | Marine craft transportation (except 4411, 4413)                                                                              |
| 45                         | Highway and street right-of-way                                                                                              |
| 47                         | Communication (except 4721)                                                                                                  |
| 48                         | Utilities                                                                                                                    |
| 49                         | Other transportation, communication, and utilities not elsewhere coded (except 492)                                          |
| 7223                       | Race tracks                                                                                                                  |
| 731                        | Fairgrounds and amusements parks                                                                                             |
| 81                         | Agriculture                                                                                                                  |
| 82                         | Agricultural and related activities                                                                                          |
| 83                         | Forestry activities and related services (including commercial forest land, timber production, and other related activities) |
| 84                         | Fishing activities and related services                                                                                      |
| 85                         | Mining activities and related services                                                                                       |
| 89                         | Other resource production and extraction activities not elsewhere coded                                                      |
| --                         | All other activities                                                                                                         |

<sup>1</sup>These SLUCM codes for land activities are designated in the Standard Land Use Coding Manual (U.S. Governmental Printing Office, 1969).

NOTE: Land uses in this category are typically manufacturing or industrial.

TABLE 5.6-5  
LAND USE ACTIVITIES IN NOISE AREA CLASSIFICATION-4 (NAC-4)

| SLUCM<br>Numerical<br>Code | <u>Land Activity</u>                                                           |
|----------------------------|--------------------------------------------------------------------------------|
| 91                         | Undeveloped and unused land area (excluding non-commercial forest development) |
| 92                         | Non-commercial forest development                                              |
| 93                         | Water areas                                                                    |
| 94                         | Vacant floor area                                                              |
| 95                         | Under construction                                                             |
| 99                         | Other undeveloped land and water areas, NEC                                    |

<sup>1</sup>These SLUCM codes for land activities are designated in the Standard Land Use Coding Manual (U.S. Government Printing Office, 1969).

NOTE: The land uses in this category are typically undeveloped land uses.

- The duration of the noise. The two duration descriptors are  $L_{10}$  and  $L_{50}$ . An  $L_{10}$  standard is a dBA level that cannot be exceeded for more than 10 percent of the time in a 1-hour survey. An  $L_{50}$  standard is a dBA level that cannot be exceeded more than 50 percent of the time in a 1-hour survey.

The MPCA standards are consistent with speech, sleep, annoyance, and conversation requirements for receivers within the applicable NAC classifications.

The noise area classifications combine land use activities according to sensitivity. These classifications are based on the Standard Land Use Coding Manual (SLUCM) numerical codes and descriptions. This coding manual was used during the original MPCA noise rules promulgation at the suggestion of the Minnesota State Planning Agency.

The noise area classifications are not considered source standards, but receiver standards. For example, if a NAC-3 and NAC-1 activity are located side-by-side, the NAC-1 standards would be applicable to the receiver.

A proposal being considered by the MPCA would change Minnesota's noise regulations to an energy equivalent noise standard:  $L_{eq}$ .  $L_{eq}$  is a long-term A-weighted sound level which is equal to the level of a steady-state continuous noise having the same energy as the time-varying noise, for a given situation and time period (typically 1-hour).

The proposed standard is shown below in Table 5.6-6. This standard, though not promulgated, is under review.

Table 5.6-6

| <u>NAC</u>      | <u>Daytime <math>L_{eq}</math></u> | <u>Nighttime <math>L_{eq}</math></u> |
|-----------------|------------------------------------|--------------------------------------|
| 1 (residential) | 63                                 | 53                                   |
| 2 (commercial)  | 68                                 | 68                                   |
| 3 (industrial)  | 78                                 | 78                                   |

### Local Ordinances

Section 908.28(1) of the City of Elk River Zoning Ordinance contains a performance standard that limits the maximum noise level from industrial operations as measured at the facility's property line. The standards apply only to industrial operations; the City has no standards relating to noise from construction.

The noise parameters tabulated were based upon requirements of the existing and proposed MPCA standards. The existing standard employs  $L_{10}$  and  $L_{50}$  noise level values (the noise levels exceeded 10 and 50 percent of the measurement time, respectively.) The proposed standard (Minnesota State Register, March 19, 1985) is based upon  $L_{eq}$ , the average energy level. Also included, where appropriate, are "background" or  $L_{90}$  noise level data (the level exceeded 90 percent of the observation time). Although not part of the regulations, this background noise level provides an indication of the quietest sound levels at a given location.

#### 5.6.1 Resource Recovery Facility Location

##### 5.6.1.1 Sensitive Receptors

The proposed location for the resource recovery facility is in the southern portion of Elk River and within an area of residential, agricultural and commercial land uses. The site is bounded by U.S. Route 10 and 169 on the southwest, 165th Street on the south, and Burlington Northern railroad tracks on the east.

##### 5.6.1.2 Noise Measurements

Noise measurements were conducted at the locations described in Table 5.6-7. Noise sources noted during the field work consisted of car and truck traffic on U.S. Routes 10 and 169 to the west; rail traffic along the boundary of the site; and traffic on local streets.

Table 5.6-8 presents a comprehensive list of measured A-weighted noise levels and observed sources of noise during each measurement

TABLE 5.6-7  
NOISE MEASUREMENT SITE DESCRIPTIONS

| Measurement<br>Site Number | Approximate<br>Distance and Direction<br>from Project Facility* |                                     | <u>Local Conditions</u>                                                                            |
|----------------------------|-----------------------------------------------------------------|-------------------------------------|----------------------------------------------------------------------------------------------------|
|                            | <u>(feet)</u>                                                   | <u>(direction)</u>                  |                                                                                                    |
| 1                          | 750                                                             | SE from<br>proposed<br>RDF facility | On north side of 165th<br>Street across from single<br>family residence                            |
| 2                          | 2000                                                            | NW from<br>proposed<br>RDF facility | Along east side of U.S.<br>Routes 10 and 169 approximately<br>50 feet from single family residence |
| 3                          | 750                                                             | SW from power<br>plant              | On west side of U.S. Route<br>10 across from entrance<br>road to UPA                               |
| 4                          | 1250                                                            | NE from power<br>plant              | At SW corner of cemetery<br>at intersecting of Evans<br>Avenue NW and Railroad Drive.              |

---

\*Referenced to approximate center of proposed site.

TABLE 5.6-8  
MEASURED COMMUNITY NOISE LEVELS (dBA)

| <u>Location</u> | <u>Date</u> | <u>Day</u> | <u>Start</u> |             | <u>Level Statistics</u> |                       |                       |                       | <u>Noise Sources</u> |
|-----------------|-------------|------------|--------------|-------------|-------------------------|-----------------------|-----------------------|-----------------------|----------------------|
|                 |             |            | <u>Hour</u>  | <u>Time</u> | <u>L<sub>90</sub></u>   | <u>L<sub>50</sub></u> | <u>L<sub>10</sub></u> | <u>L<sub>eq</sub></u> |                      |
| 1               | 2/18        | Tue        | 1025         | D           | 34                      | 39                    | 42                    | 54                    |                      |
|                 | 2/18        | Tue        | 2206         | N           | 39                      | 42                    | 46                    | 46                    |                      |
|                 | 2/19        | Wed        | 1000         | D           | 39                      | 42                    | 46                    | 51                    |                      |
| 2               | 2/18        | Tue        | 1045         | D           | 58                      | 64                    | 76                    | 72                    |                      |
|                 | 2/18        | Tue        | 2225         | N           | 39                      | 48                    | 56                    | 53                    |                      |
|                 | 2/19        | Wed        | 1021         | D           | 44                      | 50                    | 54                    | 53                    |                      |
| 3               | 2/18        | Tue        | 1125         | D           | 45                      | 54                    | 63                    | 62                    |                      |
|                 | 2/18        | Tue        | 2253         | N           | 34                      | 42                    | 54                    | 52                    |                      |
|                 | 2/19        | Wed        | 1039         | D           | 43                      | 53                    | 65                    | 62                    |                      |
| 4               | 2/18        | Tue        | 1147         | D           | 38                      | 42                    | 52                    | 59                    |                      |
|                 | 2/18        | Tue        | 2258         | N           | 34                      | 37                    | 41                    | 42                    |                      |
|                 | 2/19        | Wed        | 1056         | D           | 37                      | 39                    | 43                    | 46                    |                      |

1. Source: ERT field data survey, February, 1986
2. All dates refer to calendar year 1986.
3. D and N refer to MPCA defined day (0700-2200 hours) and night (2200-0700 hours), respectively.
4. Principal noise sources observed during noise measurement times, as noted by instrument operator.

sample. The lowest noise levels at receptors 1 and 2 were obtained on a weekday night ( $L_{50} = 39$  dBA and  $L_{10} = 42$  dBA) and the highest ( $L_{50} = 64$  dBA and  $L_{10} = 76$  dBA) during a weekday morning. Nighttime levels at location 2 were significantly lower than daytime values. These noise levels are representative of a moderate traffic volume area.

Location 1 experiences uniformly low noise levels. Location 1 is southeast of the proposed facility along 165th Street. This location could be classified as an NAC-1 area due to its rural and residential nature. The standard for NAC-1 is 60 dBA for  $L_{50}$  and 65 dBA for  $L_{10}$  during the day and 50 dBA  $L_{50}$  and 55 dBA  $L_{10}$  at night. The data show that the highest monitored  $L_{50}$  level is 42 dBA, within MPCA standards. Similarly, the highest  $L_{10}$  level is 46 dBA, also within the MPCA standards. The monitoring shows that noise levels are well within MPCA standards.

Location 2 is 2500 feet north of the intersection of 165th Street and U.S. Routes 10/169 near a single family residence. This location would be classified NAC-1 due to its residential character. The standards for NAC-1 are 60 and 65 dBA for the  $L_{50}$  and  $L_{10}$  daytime levels, and 50 and 55 dBA for the  $L_{50}$  and  $L_{10}$  nighttime values. The highest monitored daytime levels are 64 and 76 dBA for the  $L_{50}$  and  $L_{10}$  metrics, which clearly exceed standards. Similarly, the nighttime monitored values are 48 and 56 dBA for the  $L_{50}$  and  $L_{10}$  levels. The  $L_{10}$  nighttime standard is exceeded. This area would be classified as a noisy urban setting.

## 5.6.2 Power Plant

### 5.6.2.1 Sensitive Receptors

The power plant site is located northeast of U.S. Route 10 and west of the Burlington Northern Railroad. The closest sensitive receptors are a cemetery and residential area to the north. A residential area is also located approximately 2000 feet west of the power plant in Ostego Township.

#### 5.6.2.2 Noise Measurements

Noise measurements were conducted at the locations described in Table 5.6-7. Noise sources noted during the field survey included car and truck traffic on local streets and U.S. Route 10 and the Burlington Northern Railroad.

Table 5.6-8 presents the measured A weighted noise levels and observed sources of noise during each measurement sample. Measured daytime  $L_{10}$  noise levels ranged from 63 to 65 dBA for site 3, and 43 to 52 dBA for site 4. These are consistent with the traffic and industrial sources of noise in the site vicinity. Nighttime noise levels were approximately 10 dBA lower than daytime values.

Receptor 3 is located west of U.S. Route 10 along the Mississippi River and across from the access road to the power plant. Land uses in the vicinity of the receptor in Elk River are a mixture of highway interchange, industrial, and railroad related activities. Across the river in Ostego Township the predominant land use is residential. The majority of the land area in Elk River would be classified NAC-3. Noise levels measured for Receptor 3 ranged from daytime highs of 54 and 65 dBA ( $L_{50}$  and  $L_{10}$ , respectively) to nighttime lows of 42 ( $L_{50}$ ) and 54 ( $L_{10}$ ) dBA. Both daytime and nighttime measured noise levels are well within state limits (see Table 5.6-1).

Noise Receptor 4 is located at the intersection of Evans Avenue NW and Railroad Drive adjacent to the cemetery. Receptor 4 is characterized as being in a buffer zone separating residential land uses to the north from industrial uses to the south. The noise area classification for this site is NAC-1. Measured noise levels ranged from a daytime high of 42 ( $L_{50}$ ) and 52 ( $L_{10}$ ) dBA to a nighttime low of 39 ( $L_{50}$ ) and 43 ( $L_{10}$ ) dBA. These noise levels are within maximum levels of 60 ( $L_{50}$ ) and 65 ( $L_{10}$ ) dBA for daytime and 50 ( $L_{50}$ ) and 55 ( $L_{10}$ ) dBA for nighttime for residential areas.

#### 5.7 Economic and Social Conditions

The 1980 U.S. Census of Population showed approximately 6800 persons living in the City of Elk River. Preschool population under five numbered 610 or 9 percent; 555 persons, or 8.2 percent of the

city's population, were over 65. Approximately 98 percent of the population was white. Between 1970 and 1980, Elk River's population grew from 2252 persons to approximately 6800, an increase of approximately 200 percent. This growth is partially attributable to the fact that in 1978, the rural portion of the city was annexed to "old city", which represented the City of Elk River prior to the annexation. However, this growth is largely due to the location of Elk River within a growth corridor stretching between St. Cloud and the Twin Cities metropolitan area. The trend in population growth has continued; the 1985 population estimate for Elk River was 8500 persons. Much of the City of Elk River remains undeveloped given that the annexation of the rural area to the old city resulted in roughly a tenfold increase in the city's land area.

In 1980, 2095 households were recorded in Elk River. The average household size was 3.16 persons per household. Of the 2095 households, 133 families were below the poverty level.

The average household income was \$23,043.00 in 1980. Within the City there were 2193 housing units in 1980, 1657 of which were owner occupied. Only 17 percent of the city's housing stock was built prior to 1939. Between 1970 and 1980, approximately half of the city's housing stock was constructed. Of the city's total year round housing units, 78 percent, or 1660 houses were owner occupied. The median value of these units was \$62,500; 55 percent of the units were valued at \$50,000 or more. The vacancy rate for rental units was 4.4 percent.

Of the 4691 persons over 16 residing in Elk River in 1980, 183, or 5.89 percent of the labor force, were unemployed, and 1538 were not in the labor force. The distribution of the labor force by occupation was as follows:

| <u>Occupation</u>              | <u>Number</u> | <u>Percent</u> |
|--------------------------------|---------------|----------------|
| Managerial/Professional        | 671           | 22.59          |
| Technical/Sales/Administration | 834           | 28.08          |
| Services                       | 314           | 10.57          |
| Farming or Fishing             | 75            | 2.53           |
| Precision Products             | 457           | 15.39          |
| Operators/Fabricators/Laborers | <u>619</u>    | <u>0.84</u>    |
|                                | 2970          | 100.00         |

The largest employer in Elk River is United Power Association. Additional employers of 100 or more include the Elk River nursing home, Rama Tools and Plastic, Inc. and Elk River Concrete. Elk River is part of the St. Cloud labor market area which includes Sherburne, Stearns, and Benton Counties. This labor market area had a total of 61,210 persons employed in 1985, and an average annual unemployment rate of 7.4 percent. As illustrated in Table 5.7-1, the largest employment sectors were trades and services; followed by government and manufacturing. In 1985, 2890 persons were employed in the construction trades in this labor market area. A number of those who reside in Elk River also work in the Minneapolis-St. Paul labor market area. This labor market area includes the eleven counties of Anoka, Carver, Chisago, Dakota, Hennepin, Isanti, Ramsey, Scott, Washington, and Wright in Minnesota, and St. Croix County in Wisconsin. In the first six months of 1985, unemployment in this labor market varied from 4.3 to 3.6 percent. Wholesale and retail trade was the largest sector whereas services were the most expansive sector. The growth in the Minneapolis-St. Paul Metropolitan labor area is above the national average. The numbers employed by industry are presented in Table 5.7-2.

Anoka County lies to the east of Elk River. Anoka County is one of seven counties comprising the metropolitan region. The County had a total population of 196,107 in 1980, which was considerably less than the more populous counties comprising the Metropolitan Area, including Hennepin and Ramsey Counties. The Metropolitan Council's projections include a 1990 population estimate of 235,000 for Anoka County. Between 1990 and 2000, growth is projected to occur at a slightly lower rate.

TABLE 5.7-1  
EMPLOYMENT IN THE ST. CLOUD LABOR MARKET AREA

| <u>Industry</u>                                       | <u>Employment 1985</u> |
|-------------------------------------------------------|------------------------|
| Manufacturing                                         | 10,630                 |
| Construction                                          | 2,890                  |
| Transportation, Public Utilities<br>and Communication | 3,610                  |
| Trades                                                | 16,940                 |
| Finance, Insurance, and Real Estate                   | 2,170                  |
| Services and Miscellaneous                            | 13,110                 |
| Government                                            | <u>11,870</u>          |
| <br>TOTAL                                             | <br>61,220             |

TABLE 5.7-2

DISTRIBUTION OF INDUSTRY EMPLOYMENT IN THE  
MINNEAPOLIS-ST. PAUL METROPOLITAN AREA

| <u>Industry</u>                               | <u>Employment-May 1985</u><br><u>(000)</u> | <u>Number Unemployed-May<sup>2</sup> 1985</u><br><u>(000)</u> |
|-----------------------------------------------|--------------------------------------------|---------------------------------------------------------------|
| Total Non-agricultural                        | 1214.2                                     | 20.9*                                                         |
| Manufacturing                                 | 258.9                                      | 6.9                                                           |
| Durable Goods                                 | 165.1                                      | 5.5                                                           |
| Non-durable Goods                             | 93.8                                       | 1.4                                                           |
| Non-Manufacturing                             | 955.3                                      |                                                               |
| Construction                                  | 47.3                                       | 5.4                                                           |
| Transportation, Public Utilities<br>and Comm. | 78.7                                       | .9                                                            |
| Trade                                         | 299.7                                      | 3.5                                                           |
| Finance, Insurance, and<br>Real Estate        | 81.8                                       | .7                                                            |
| Service and Miscellaneous <sup>1</sup>        | 296.5                                      | 3.2                                                           |
| Government                                    | 161.3                                      | .2                                                            |

<sup>1</sup> Includes lodging and recreation, personal services, business services, repair services, health services, legal services, private education, social services, and miscellaneous services such as engineering and accounting.

<sup>2</sup> Refers to the number of unemployment insurance claimants.

\* Does not add up to 20.9 due to rounding.

Source: Twin Cities Labor Market Information, Minnesota Dept. of Economic Security, June, 1985.

## 6. IMPACTS AND MITIGATION

This chapter of the EIS summarizes the significant impacts associated with development of the Anoka County RDF facility. The impact analysis is based on the project description and available engineering data. Where information has not been developed, data from other similar facilities is used as the basis for analysis. Impacts discussed in detail parallel the environmental baseline presented in Chapter 5.

### 6.1 Air Quality

An analysis has been conducted to assess the expected air quality impacts associated with construction activities and operation of the resource recovery facility and the combustion of its refuse-derived fuel (RDF). Air related impacts of the construction and operation of the proposed plant and the combustion of its RDF would originate from the following sources:

#### During Construction

- Fugitive dust from excavation and vehicular exhaust from employee traffic and heavy equipment.

#### During Operation

- Fugitive dust and odors from the refuse processing facility,
- Various pollutants from the combustion of the RDF.

The analyses considered the impacts of the processing facility and the combustion of its RDF at UPA's Elk River generating station along with other sources of air pollution in the project area. The analyses presented in this section address impacts of the criteria pollutants ( $\text{SO}_2$ , TSP, CO,  $\text{NO}_2$ , Pb) and certain other regulated pollutants. The latter includes asbestos, beryllium, mercury, vinyl chloride, fluorides, hydrogen sulfide, reduced sulfur and chlorides. Other

pollutants of concern that would likely be emitted from combustion of the RDF but which are not federally or state regulated (non-criteria pollutants) are considered in Subsection 6.8, Health and Safety. The following subsections present the analysis methods used as well as the results. These results consider operations for (1) a single line facility processing 500 tons per day (tpd) municipal solid waste (MSW), (2) a two-line facility processing 1000 tpd, and (3) a three-line facility processing 1500 tpd (design capacity 1526 tpd).

#### 6.1.1 Construction Impacts

Operation of construction equipment, especially those involving earth moving, produce fugitive dust. Construction at the refuse processing facility site would involve grading and earth moving activities. The majority of the mobile source and fugitive particulate emissions are expected to be associated with such earth moving activities. Although impacts from earth moving and total construction activities would be short-term and localized, several measures can be employed to mitigate their effect. Among the measures that would help minimize the potential for dust generation during construction are the following:

- staging of development;
- prompt revegetation of disturbed areas; and
- watering of exposed areas (including temporary unpaved roads).

Implementation of these measures should result in minimal air quality impacts due to construction.

#### 6.1.2 Processing Plant Impacts

##### 6.1.2.1 Fugitive Dust

Dust would be generated from operations at the refuse processing plant. Dust impacts from transportation of raw waste and processed materials would be minimal as these materials would be hauled in

enclosed trailers. All access roads and parking areas would be paved also minimizing dust generation. Raw MSW is sufficiently moist that dust generated on the tipping floor in the receiving building is expected to be small.

Some dust would be generated inside the processing building. However, collection of fugitive dust, dust from air knives, the secondary shredder and the RDF conveyors would be accomplished by four independent and separate dust collection sub-systems. Each dust collection sub-system would have its own exhaust fan and dust collector. All dust collectors would discharge collected dust back to the process stream. In all cases, only clean air would be exhausted to the atmosphere. Exhaust air would be returned to the baghouse for filtration. Exhaust air blowers will create a negative air pressure within the building. This negative pressure will facilitate dust and odor control. In order to help quantify such dust emissions from the proposed Anoka County processing plant, the controlled dust emissions (on a design basis) from an RDF processing facility in Haverhill, Massachusetts were reviewed. Based upon operations at the Haverhill facility, it is estimated that the proposed Anoka County plant would emit approximately 5 tons per year (tpy) of dust for a single line facility processing 500 tpd MSW, 10 tpy for a two-line facility processing 1000 tpd, and 16 tpy for a three-line facility processing 1526 tpd. These emission rates would be below EPA's significant emission rate of 25 tpy for particulate matter. Because EPA established significant emission rates at levels which should result in an insignificant impact on air quality, dust impacts from the proposed processing plant would be minimal.

#### 6.1.2.2 Odor

The MPCA regulates odors in Minnesota (Minn. Rules, 1978, chapter 7005.0900). The MPCA rules define an odor concentration unit as follows:

"Odor concentration unit shall mean the number of standard cubic feet of odor-free air needed to dilute each cubic foot of

contaminated air so that at least 50 percent of the odor concentration test panel does not detect any odor in the diluted mixture."

The test panel referred to in the definition consists of individuals who undergo a sensitivity test to odor thresholds. These tests are based on what is known as the dilution method which acknowledges that the panelist can report the presence or absence of an odor with more certainty than objectively can be determined. During the test, a sample of air contaminated by the odorous compound is diluted with odor-free air until a dilution is achieved in which the odor is barely detectable by half of the odor panel.

Impacts of odor from the proposed processing facility are not anticipated to be significant, although it is impossible to completely eliminate refuse-associated odors. During transportation to the facility, odors would be contained within the vehicles transporting the wastes. Once at the facility, odor impacts from unprocessed refuse would be minimized by preventing the discharge of odors into the external environment: the tipping and processing floors would be enclosed, with the exception of the doors used for the entrance and exit of trucks. In addition, a reodorant spray system would be installed in the waste receiving area. Metered reodorant from the system would be used to neutralize odors, and thus produce a different odor resulting in a lower overall level. Additionally, refuse would be removed from the tipping floor and normally processed upon receipt. Immediate processing of the wastes provides the primary means of odor control by reducing the chances of partial decomposition. Residual odors from the tipping floor would be eliminated by cleaning and sweeping the tipping floor each night.

Once the RDF is separated from the waste stream, the potential for odor impacts would be further reduced. The RDF has no noticeable odor unless it is stored in large quantities over extended periods of time. However, because the RDF would be removed from the plant immediately after processing, no odor is anticipated.

An on-site visit by ERT, the MPCA consultant, to an existing RDF facility in Baltimore, Maryland confirmed that the odor generated by an RDF facility is minimal. The refuse at that facility was continually

processed, thereby minimizing the potential for odor problems. The reodorant applied at the transfer station produced a not unpleasing odor. Some malodor was present in the facility, however, it was primarily restricted to a few areas in the processing stream at the top of the enclosed building. The waste was generally processed in the top half of the processing building above the open receiving doors; any slight odor and dust associated with the process seemed to be restricted to these areas. The air in the upper portions of the building was collected and subjected to a filtering process which reduced the odor. As a result of the constant circulation of air in the building, odor was not observed to be a problem.

#### 6.1.3 Combustion Source Impacts

The RDF processed at the proposed Anoka County Resource Recovery facility would be burned in existing boilers at UPA's Elk River generating station to produce the steam required to drive its electric power generating turbines. The three boiler units at the Elk River station are currently fired with coal. Two of the units, Nos.1 and 2, would be converted to dedicated RDF combustion. The third unit, No.3, would also be converted to RDF combustion if MSW processed at the resource recovery facility reached design capacity, but would retain its capability of burning coal.

##### 6.1.3.1 General Approach

The air quality impacts resulting from the combustion of RDF at the Elk River generating station were estimated using air quality modeling techniques approved by the U.S. EPA (the Industrial Source Complex model). Air quality modeling is an analytical tool used to estimate ambient air concentrations caused by pollutant emissions. Pollutants, such as the  $\text{SO}_2$  generated by the Elk River station boilers, are emitted from a stack at certain rates or concentrations. This concentration level is a measure of the amount of a pollutant contained in a unit volume (parcel) of gas that is discharged from the stack. The emitted pollutants become mixed with the ambient air flow

and are carried downwind from their original release point. Turbulent air motions will entrain surrounding air into the polluted parcel of air, and thus, increase the volume of air (parcel) that contains the pollutants. Therefore, the concentration in the parcel, and subsequently at the ground, will ordinarily be substantially less than was emitted from the stack. A dispersion model estimates ground-level concentrations at specific locations by mathematically simulating the dilution of a parcel of air containing the pollutant as it travels between the source and the receptor locations. The rate of dilution is a function of several meteorological factors, which include wind speed, atmospheric stability, and other physical factors, such as topography and building structures.

Impacts were assessed for the combustion of RDF at the Elk River station based upon (1) a single line facility processing 500 tons per day MSW, (2) a two-line facility processing 1000 tons per day and (3) a three-line facility processing 1500 tons per day. At maximum design capacity, the three Elk River boiler units would operate on RDF, whereas for reduced operations only two units, Nos.1 and 2, would operate exclusively on RDF. In either case, the third unit, No.3, would retain its capability of burning coal. Therefore, the impacts of Unit No.3 operating on coal were also evaluated.

#### 6.1.3.2 Model Selection

Three criteria were considered in selecting the appropriate model for use in estimating pollutant impacts from the Elk River generating station:

- (1) dispersion environment;
- (2) stack height; and
- (3) local topography.

#### Dispersion Environment

The rate at which a plume from a stationary source disperses and eventually reaches the ground is affected by the land-use

characteristics of the surrounding area. Generally greater plume dispersion is found in urban than in rural areas due to the greater mechanical and thermal mixing caused by the larger roughness and heating effects in the urban environment. The selection of either an urban or rural (i.e., non-urban) model for use in simulating the impact of the Elk River generating station was based on an EPA-recommended procedure that characterizes an area into 12 land use types. In this scheme, areas comprising industrial, commercial and compact residential land use are designated urban. According to the EPA procedures (1981b), if more than 50 percent of an area circumscribed by a three kilometer radius circle about the source is classified as urban, dispersion coefficients appropriate to an urban environment should be used in the air quality modeling assessment.

Based upon review of the "pink shaded" areas (high population density) on the U.S.G.S. quadrangle for Elk River, substantially less than 50 percent of the area within a 3 kilometer radius of the Elk River generating station can be classified as urban. Thus, the dispersion environment of the area was classified as rural. This determination requires the application of rural dispersion rates for the modeling analysis of the Elk River station.

#### GEP Stack Height Analysis

Section 123 of the 1977 Clean Air Act Amendments required EPA to promulgate regulations to assure that the control of any air pollutant under an applicable State Implementation Plan (SIP) was not affected by (1) stack heights that exceed good engineering practice (GEP) or (2) any other dispersion technique. GEP is defined with respect to stack height as the "height necessary to ensure that emissions from the stack do not result in excessive concentrations of any air pollutant in the immediate vicinity of the source as a result of atmospheric downwash, eddys, and wakes that may be created by the source itself, nearby structures, or nearby terrain obstacles" (EPA 1981a).

The GEP definition is based on the observed phenomena of disturbed atmospheric flow in the immediate vicinity of a structure. It identifies the stack height at which the effects of such aerodynamics

(downwash) on plume behavior are minimized. The GEP stack height allowed under the 8 July 1985 regulation for the UPA Elk River stack is calculated from:

$$H_G = H + 1.5L \quad (6.1-1)$$

where:  $H_G$  is the maximum GEP stack height,  
H is the height of the nearby structure, and  
L is the lesser dimension (height or width) of the nearby structure, called the critical dimension.

Both the height and width of the structure are determined from the frontal area of the structure projected onto a plane perpendicular to the direction of the wind. The GEP stack height is calculated by substituting the plane projections of each nearby building into equation 6.1-1 and solving for  $H_G$ . For the purpose of determining the GEP height, nearby is limited to five structure heights or widths, whichever is less, downwind from the trailing edge of the structure. The GEP allowable height is defined as the maximum of all the calculated GEP heights. In the case where a stack is isolated from nearby structures, the GEP stack height is defined as 213 feet. [See Guideline for Determination of Good Engineering Practice Stack Height (EPA, 1985)]

The dominant building structure at the Elk River generating station is the steam plant building. The height of this GEP controlling structure is 54 feet above the stack base elevation and the lateral dimensions are 128 feet by 22.5 feet. The maximum projected width onto a plane perpendicular to the wind when considering all wind directions is 130 feet. Thus, the height is the lesser dimension of the building. Consequently, the estimated GEP formula height reduces to 2.5 times the building height or 135 feet. The stack servicing the boiler units at the Elk River station is 125 feet which is less than the maximum calculated GEP height. Therefore, an evaluation of the potential effects of building downwash on ground-level pollutant concentrations was included in this assessment.

### Topography

Local topography also plays a role in the choice of an appropriate dispersion model. A certain class of models is applicable for use in areas where local terrain is less than the height of the top of the stack, whereas another class of models is applicable for use in areas where local terrain is greater than the height of the top of the stack. Terrain elevations within the study area are generally less than the height of the top of the Elk River station stack (1027 feet above sea level). The highest terrain elevations within 10 km of the station are to the north and north-northwest at distances of 4 to 5 kilometers. Terrain heights in these areas reach a maximum elevation of 1110 feet above mean sea level.

### Model Selected

The U.S. EPA-approved Industrial Source Complex (ISC) model was used to estimate hour-by-hour ground-level concentrations of pollutants emitted from the Elk River generating station. ISC is a steady-state Gaussian model which was developed for EPA to simulate dispersion from a variety of sources which may be located in or near an industrial complex. ISC was selected for this evaluation because it has several desirable features: (1) the model provides for rural dispersion effects, (2) it accounts for the potential of aerodynamic downwash of plumes from stacks below GEP height, and (3) it allows the input of receptor terrain heights up to stack top elevation. Each of these factors should be considered in the assessment given the design and location of the Elk River station.

#### 6.1.3.3 Meteorological Data

Hourly pollutant concentrations were calculated using five years (1973-1977) of meteorological data from Minneapolis-St. Paul International Airport (surface data) and St. Cloud, Minnesota (upper air data). The Minnesota-St. Paul International Airport is located approximately 30 miles to the south-southeast of the project site. The

Minneapolis-St. Paul surface data used by the model are wind speed, wind direction, atmospheric stability, and temperature. The St. Cloud upper air data were used to determine mixing heights from vertical temperature profiles measured twice daily by radiosonde ascents.

#### 6.1.3.4 Source Data

##### Elk River Generating Station

The generating station uses three boilers to produce the steam required to drive its electric power generating turbines. The exhaust gases from each of the boilers are ducted into a single eight-chamber baghouse. The cleaned gases are released into the atmosphere from a single 125-foot stack.

Values of the stack and flue gas parameters along with emission rates are listed in Tables 6.1-1 through 6.1-4 for alternative load configurations. Tables 6.1-1 and 6.1-2, respectively, give this information for conditions when one of the boiler units (Nos.1 or 2) and two of the boiler units (Nos. 1 and 2) are operating on RDF. Table 6.1-3 gives this information for conditions when all three boiler units are operating on RDF. Because boiler unit No.3 will retain its capability of burning coal, Table 6.1 -4 gives this information for conditions when unit No.3 is operating individually on coal. The dispersion modeling analyses were performed using these inputs to assess the impacts of the combustion of RDF at the Elk River station, and individually the impacts of the combustion of coal in unit No.3.

##### Other Major Stationary Sources

Background SO<sub>2</sub>, particulate matter, and NO<sub>2</sub> emission sources were evaluated for their potential for cumulative impacts with the Elk River generating station based on their size and distance from the station. Sources located within 10 kilometers of Elk River and whose emissions for SO<sub>2</sub>, particulate matter or NO<sub>2</sub> were 100 tons per year (tpy) or greater and 1000 tpy sources of SO<sub>2</sub>, particulates or NO<sub>2</sub> within 20 kilometers were identified for further evaluation. The effect

TABLE 6.1-1  
STACK PARAMETERS FOR ELK RIVER BOILER No.1 OR 2  
OPERATING ON RDF (500 TPD)

| <u>Parameter</u>             | <u>50% Load</u>      | <u>75% Load</u>      | <u>100% Load</u>     |
|------------------------------|----------------------|----------------------|----------------------|
| Boiler Heat Input (MMBtu/hr) | 88                   | 131                  | 175                  |
| Stack Height (ft)            | 125                  | 125                  | 125                  |
| Stack Diameter (ft)          | 8                    | 8                    | 8                    |
| Volumetric Flow Rate (acfm)  | 38,000               | 57,000               | 76,000               |
| Exit Temperature (°F)        | 317                  | 327                  | 337                  |
| Emission Rate (lb/hr)        |                      |                      |                      |
| Particulates                 | 6.7                  | 10.0                 | 13.3                 |
| SO <sub>2</sub>              | 64                   | 96                   | 128                  |
| NO <sub>2</sub>              | 32                   | 47                   | 63                   |
| CO                           | 45                   | 67                   | 89                   |
| NMHC                         | 2.4                  | 3.5                  | 4.7                  |
| Lead                         | $3.7 \times 10^{-1}$ | $5.5 \times 10^{-1}$ | $7.4 \times 10^{-1}$ |
| Beryllium                    | $2.4 \times 10^{-6}$ | $3.5 \times 10^{-6}$ | $4.7 \times 10^{-6}$ |
| Mercury                      | $1.3 \times 10^{-2}$ | $1.9 \times 10^{-2}$ | $2.5 \times 10^{-2}$ |
| Hydrogen Chloride            | 80                   | 119                  | 159                  |
| Hydrogen Fluoride            | $3.9 \times 10^{-1}$ | $5.9 \times 10^{-1}$ | $7.9 \times 10^{-1}$ |
| Asbestos                     |                      | Negligible           |                      |
| Vinyl Chloride               |                      | Negligible           |                      |
| Hydrogen Sulfide             |                      | Negligible           |                      |
| Reduced Sulfur               |                      | Negligible           |                      |

**Note:**

- 1) Particulate, SO<sub>2</sub>, NO<sub>2</sub> and HCl emission rate provided by UPA.
- 2) NMHC, PB, BE, Mercury and Hydrogen Fluoride emission rates obtained from "Flue Gas Emissions from Municipal-Refuse Fired Steam Generator," Heber and Reed, p. 167. National Waste Processing Conference Proceedings, 1980-82.
- 3) Asbestos, Hydrogen Sulfide, Vinyl Chloride and Reduced Sulfur emission rates obtained from "Alternate Resources, Inc.," 1986.

TABLE 6.1-2  
STACK PARAMETERS FOR ELK RIVER BOILER Nos.1 AND 2  
OPERATING ON RDF (1000 TPD)

| <u>Parameter</u>             | <u>50% Load</u>      | <u>75% Load</u>      | <u>100% Load</u>     |
|------------------------------|----------------------|----------------------|----------------------|
| Boiler Heat Input (MMBtu/hr) | 175                  | 262                  | 350                  |
| Stack Height (ft)            | 125                  | 125                  | 125                  |
| Stack Diameter (ft)          | 8                    | 8                    | 8                    |
| Volumetric Flow Rate (acfm)  | 76,000               | 114,000              | 152,000              |
| Exit Temperature (°F)        | 317                  | 327                  | 337                  |
| Emission Rate (lb/hr)        |                      |                      |                      |
| Particulates                 | 13.3                 | 20.0                 | 26.6                 |
| SO <sub>2</sub>              | 128                  | 192                  | 256                  |
| NO <sub>2</sub>              | 63                   | 94                   | 126                  |
| CO                           | 89                   | 134                  | 178                  |
| NMHC                         | 4.7                  | 7.1                  | 9.4                  |
| Lead                         | $7.4 \times 10^{-1}$ | 1.1                  | 1.5                  |
| Beryllium                    | $4.7 \times 10^{-6}$ | $7.1 \times 10^{-6}$ | $9.4 \times 10^{-6}$ |
| Mercury                      | $2.5 \times 10^{-2}$ | $3.8 \times 10^{-2}$ | $5.1 \times 10^{-2}$ |
| Hydrogen Chloride            | 159                  | 239                  | 318                  |
| Hydrogen Fluoride            | $7.9 \times 10^{-1}$ | 1.2                  | 1.6                  |
| Asbestos                     |                      | Negligible           |                      |
| Vinyl Chloride               |                      | Negligible           |                      |
| Hydrogen Sulfide             |                      | Negligible           |                      |
| Reduced Sulfur               |                      | Negligible           |                      |

**Note:**

- 1) Particulate, SO<sub>2</sub>, NO<sub>2</sub> and HCl emission rate provided by UPA.
- 2) NMHC, PB, BE, Mercury and Hydrogen Fluoride emission rates obtained from "Flue Gas Emissions from Municipal-Refuse Fired Steam Generator," Heber and Reed, p. 167. National Waste Processing Conference Proceedings, 1980-82.
- 3) Asbestos, Hydrogen Sulfide, Vinyl Chloride and Reduced Sulfur emission rates obtained from "Alternate Resources, Inc.," 1986.

TABLE 6.1-3  
STACK PARAMETERS FOR ELK RIVER BOILER Nos.1, 2 AND 3  
OPERATING ON RDF (1500 TPD)

| <u>Parameter</u>             | <u>50% Load</u>      | <u>75% Load</u>      | <u>100% Load</u>     |
|------------------------------|----------------------|----------------------|----------------------|
| Boiler Heat Input (MMBtu/hr) | 280                  | 420                  | 564                  |
| Stack Height (ft)            | 125                  | 125                  | 125                  |
| Stack Diameter (ft)          | 8                    | 8                    | 8                    |
| Volumetric Flow Rate (acfm)  | 120,300              | 181,500              | 245,000              |
| Exit Temperature (°F)        | 302                  | 319                  | 337                  |
| Emission Rate (lb/hr)        |                      |                      |                      |
| Particulates                 | 21.3                 | 32.0                 | 42.9                 |
| SO <sub>2</sub>              | 204                  | 307                  | 412                  |
| NO <sub>2</sub>              | 101                  | 151                  | 203                  |
| CO                           | 143                  | 214                  | 288                  |
| NMHC                         | 7.6                  | 11.4                 | 15.2                 |
| Lead                         | 1.2                  | 1.8                  | 2.4                  |
| Beryllium                    | $7.6 \times 10^{-6}$ | $1.1 \times 10^{-5}$ | $1.5 \times 10^{-5}$ |
| Mercury                      | $4.1 \times 10^{-2}$ | $6.1 \times 10^{-2}$ | $8.2 \times 10^{-2}$ |
| Hydrogen Chloride            | 225                  | 383                  | 513                  |
| Hydrogen Fluoride            | 1.3                  | 1.9                  | 2.5                  |
| Asbestos                     |                      | Negligible           |                      |
| Vinyl Chloride               |                      | Negligible           |                      |
| Hydrogen Sulfide             |                      | Negligible           |                      |
| Reduced Sulfur               |                      | Negligible           |                      |

**Note:**

- 1) Particulates, SO<sub>2</sub>, NO<sub>2</sub> and HCl emission rates provided by UPA.
- 2) NMHC, PB, BE, Mercury and Hydrogen Fluoride emission rates obtained from "Flue Gas Emissions from Municipal-Refuse Fired Steam Generator," Heber and Reed, p. 167. National Waste Processing Conference Proceedings, 1980-82.
- 3) Asbestos, Hydrogen Sulfide, Vinyl Chloride and Reduced Sulfur emission rates obtained from "Alternate Resources, Inc.," 1986.

TABLE 6.1-4  
STACK PARAMETERS FOR ELK RIVER BOILER No.3  
OPERATING ON COAL

| <u>Parameter</u>             | <u>50% Load</u>      | <u>75% Load</u>      | <u>100% Load</u>     |
|------------------------------|----------------------|----------------------|----------------------|
| Boiler Heat Input (MMBtu/hr) | 143                  | 212                  | 281                  |
| Stack Height (ft)            | 125                  | 125                  | 125                  |
| Stack Diameter (ft)          | 8                    | 8                    | 8                    |
| Volumetric Flow Rate (acfm)  | 48,700               | 73,100               | 99,300               |
| Exit Temperature (°F)        | 275                  | 306                  | 336                  |
| Emission Rate (lb/hr)        |                      |                      |                      |
| Particulates                 | 14.3                 | 21.2                 | 28.1                 |
| SO <sub>2</sub>              | 343                  | 509                  | 674                  |
| NO <sub>2</sub>              | 157                  | 233                  | 309                  |
| CO                           | 86                   | 127                  | 169                  |
| NMHC                         | $1.3 \times 10^{-4}$ | $1.9 \times 10^{-4}$ | $2.5 \times 10^{-4}$ |
| Lead                         | $7.0 \times 10^{-3}$ | $1.0 \times 10^{-2}$ | $1.4 \times 10^{-2}$ |
| Beryllium                    | $6.3 \times 10^{-5}$ | $9.3 \times 10^{-5}$ | $1.2 \times 10^{-4}$ |
| Mercury                      | $8.5 \times 10^{-4}$ | $1.3 \times 10^{-3}$ | $1.7 \times 10^{-3}$ |
| Hydrogen Chloride            | 15                   | 22                   | 29                   |
| Hydrogen Fluoride            | $7.9 \times 10^{-4}$ | $1.2 \times 10^{-3}$ | $1.5 \times 10^{-3}$ |
| Asbestos                     |                      | Negligible           |                      |
| Vinyl Chloride               |                      | Negligible           |                      |
| Hydrogen Sulfide             |                      | Negligible           |                      |
| Reduced Sulfur               |                      | Negligible           |                      |

Note:

- 1) Particulate, SO<sub>2</sub>, NO<sub>2</sub> and HCl emission rate provided by UPA.
- 2) Lead emission rates obtained from "Bay Area Resource Recovery Facility Project," California Energy Commission, 1985.
- 3) All other emission rates obtained from "Estimated Ground Level Concentrations of Pollutants from Waste-to-Energy Facilities," Olexsey, Freeman, and Brailey, USEPA, Cincinnati, Ohio, p. 587, National Waste Processing Conference Proceedings, 1980 and 1982.

of sources beyond 20 kilometers from the generating station was assumed to be represented in the monitoring component of the background concentration estimates (see Section 6.1.3.8).

Data from the latest year Emissions Inventory obtained from the MPCA were reviewed to determine the sources which met the above criteria. No sources were identified which met these criteria. The closest major source of SO<sub>2</sub>, particulate matter, and NO<sub>2</sub> emissions to the Elk River station is NSP's Sherco Power Plant, located about 28 kilometers to the west-northwest. Physical stack data and emission parameters for this plant are listed in Table 6.1-5.

#### 6.1.3.5 Screening Modeling Analysis of the Elk River Generating Station

A screening modeling analysis was conducted to initially determine maximum short-term ground-level concentrations for various operating conditions of the Elk River generating station (see Tables 6.1-1 through 6.1-4) and to aid in the selection of receptor locations for the detailed modeling analysis. The ISC dispersion model was applied with a range of meteorological conditions to assess the potential air quality impact of expected air emissions from the generating station. Table 6.1-6 lists the ISC model options used for this analysis. The receptor distances and meteorological conditions are presented in Table 6.1-7.

The results of the ISC screening model analyses presented in Table 6.1-8 show that, in general, maximum one-hour concentrations are predicted to occur when the three boiler units are operating at 100 percent load. Based upon these screening model calculations, the detailed modeling analysis was performed using the entire five-year meteorological data record for this operating case. The top ten values of predicted 1-hour, 3-hour, 8-hour and 24-hour pollutant concentrations were then identified from the detailed modeling for each of the 5 years and these periods used for further evaluation of the remaining operating cases.

#### 6.1.3.6 Receptor Locations for the Detailed Modeling Analysis

TABLE 6.1-5  
STACK PARAMETERS FOR NSP's SHERCO POWER PLANT

| <u>Source</u> | <u>Location</u> |             | <u>Units</u> | <u>Stack Parameters</u>      |                                |                            |                              | <u>Emissions</u>      |            |                       |
|---------------|-----------------|-------------|--------------|------------------------------|--------------------------------|----------------------------|------------------------------|-----------------------|------------|-----------------------|
|               | <u>UTMX</u>     | <u>UTMY</u> |              | <u>Height</u><br><u>(ft)</u> | <u>Diameter</u><br><u>(ft)</u> | <u>Temp</u><br><u>(°F)</u> | <u>Flow</u><br><u>(acfm)</u> | <u>(lb/hr)</u>        |            |                       |
|               |                 |             |              |                              |                                |                            |                              | <u>SO<sub>2</sub></u> | <u>TSP</u> | <u>NO<sub>2</sub></u> |
| Sherco        | 430.0           | 5025.0      | 1-2          | 650                          | 32.5                           | 171                        | $5.2 \times 10^{-6}$         | 4050                  | 900        | 5135                  |
|               |                 |             | 3            | 650                          | 26.5                           | 160                        | $3.2 \times 10^{-6}$         | 2300                  | 510        | 2915                  |

Source: NSP, 1986.

TABLE 6.1-6  
ISC MODEL OPTIONS FOR SCREENING AND  
DETAILED MODELING ANALYSES

| <u>Option Description</u>               | <u>Value</u> |
|-----------------------------------------|--------------|
| Dispersion Parameters                   | Rural        |
| Wind Profile Exponents                  | Default      |
| Vertical Potential Temperature Gradient | Default      |
| Stack Tip Downwash                      | Not Used     |
| Entrainment Coefficients                | 0.6          |
| Anemometer height                       | 6.4 m        |
| Decay Coefficient                       | 0.0          |
| Building Downwash                       | Used         |
| Gradual Plume Rise                      | Used         |

Source: ERT, 1986.

TABLE 6.1-7  
RECEPTOR LOCATIONS AND METEOROLOGICAL DATA  
FOR SCREENING ANALYSES

| <u>Receptor Locations*</u>   |                  |
|------------------------------|------------------|
| <u>Downwind Distance (m)</u> |                  |
| <u>Range</u>                 | <u>Increment</u> |
| 100- 1,000                   | 100              |
| 1,500- 5,000                 | 500              |
| 7,500-10,000                 | 2,500            |

| <u>METEOROLOGICAL CONDITIONS**</u> |                         |
|------------------------------------|-------------------------|
| <u>Stability</u>                   | <u>Wind Speed (m/s)</u> |
| A                                  | 1,3                     |
| B                                  | 1,3,5                   |
| C                                  | 1,3,5,10                |
| D                                  | 1,3,5,10,15,20          |
| E                                  | 1,3,5                   |
| F                                  | 1,3,5                   |

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\*Terrain heights are the maximum elevation at each downwind distance over all wind directions.

\*\*Mixing height = 5,000 m; ambient temperature = 293°K;  
Wind direction = 90° (centerline concentrations).

Source: ERT, 1986.

TABLE 6.1-8  
HIGHEST 1-HOUR SO<sub>2</sub> CONCENTRATIONS RESULTING  
FROM ISC SCREENING MODEL CALCULATIONS

|                                        | <u>Concentration (micrograms per cubic meter)</u> |                 |                  |
|----------------------------------------|---------------------------------------------------|-----------------|------------------|
|                                        | <u>50% Load</u>                                   | <u>75% Load</u> | <u>100% Load</u> |
| One Boiler Unit<br>Operating on RDF    | 88.8                                              | 104.0           | 109.8            |
| Two Boiler Units<br>Operating on RDF   | 103.7                                             | 91.4            | 93.0             |
| Three Boiler Units<br>Operating on RDF | 122.8                                             | 115.7           | 98.9             |

Source: ERT, 1986.

A radial receptor grid was used to determine the impact of the Elk River generating station. Based upon the results of the screening modeling analysis, the receptor points were located at the intersection of 36 radials spaced every 10 (starting at 10 and proceeding clockwise through 360) and the following 10 downwind distances (km): 0.2, 0.5, 1.0, 1.5, 2.0, 3.0, 4.0, 5.0, 7.5 and 10.0. The maximum terrain elevation in the immediate vicinity of each receptor was selected as the receptor height (with this height restricted to no greater than the height of the Elk River station stack - 1027 feet above sea level). Immediate vicinity is the area defined by:

- Two radials spaced  $\pm 5$  from the receptor's radial;
- One arc which is equidistant from the receptor's ring and the next ring (for the 10 km ring, it was assumed that the arc was located 11.25 km from the source);
- One arc which is equidistant from the receptor's ring and the previous ring (for the 0.2 km ring, it was assumed that the arc was located at the source).

#### 6.1.3.7 Detailed Modeling Analysis

Hourly normalized concentrations (CQ) were calculated for three boiler units operating at 100 percent load using the ISC dispersion model, the entire five-year meteorological data record and the receptor grid discussed above. The top ten values of predicted 1-hour, 3-hour, 8-hour and 24-hour average concentrations were then identified for each of the 5 years and these periods were then used to calculate hourly concentrations for the remaining operating cases. Combining the various averaging periods resulted in a list of 16 highest meteorological days for 1974, 17 days each for 1975 and 1977, and 21 days each for 1973 and 1976. Therefore, a total of 92 days were used in subsequent refined model calculations. Pollutant-specific concentrations were determined by multiplying normalized concentrations by the pollutant emission rate. The ISC model options used in this analysis are presented in Table 6.1-6. The calculated impacts due to

the Elk River generating station for 100, 75, and 50 percent loads were determined for:

- one boiler unit (Nos.1 or 2) operating on RDF;
- two boiler units (Nos.1 and 2) operating on RDF;
- three boiler units operating on RDF; and
- boiler unit No.3 operating alone on coal.

Current EPA policy allows hourly concentrations calculated with National Weather Service meteorological data to be considered missing if the hour is reported as a calm condition. A calm hour is defined as any hour for which the wind speed is less than 2 knots. The model output containing the hourly concentrations were examined for critical concentration periods to exclude any calm hours of impact.

#### 6.1.3.8 Background Concentrations

Regional background air quality, defined as the air quality concentrations due to unmodeled sources, was determined from existing air monitoring data (see Section 5.1). These data were used to represent the contributions of all unmodeled sources. For short-term averaging periods, the highest of the second-highest concentrations (allowing for the once to be exceeded short-term NAAQS) measured during each of the last three calendar years were selected as the background concentration. For long-term averages, the maximum concentration from the three-year period was selected. These background estimates are presented in Table 6.1-9.

No major sources (i.e., 100 tpy pollutant emissions within 10 kilometers and 1000 tpy pollutant emissions within 20 kilometers of the Elk River generating station) were identified (see Section 6.1.3.4). Sources with emissions below these criteria along with major sources beyond 20 kilometers were assumed to be represented in the monitoring component of the background concentration estimates. Therefore, background concentrations were derived entirely from the monitoring data with no modeled component.

TABLE 6.1-9  
MONITORED AMBIENT BACKGROUND POLLUTANT  
CONCENTRATIONS

| <u>Pollutant</u> | <u>Averaging<br/>Time</u> | <u>Background<br/>Concentration</u>  |
|------------------|---------------------------|--------------------------------------|
| SO <sub>2</sub>  | 1-hour                    | 0.095 ppm (249 µg/m <sup>3</sup> )   |
|                  | 24-hour                   | 0.028 ppm (73 µg/m <sup>3</sup> )    |
|                  | Annual                    | 0.005 ppm (13 µg/m <sup>3</sup> )    |
| Particulates     | 24-hour                   | 136 µg/m <sup>3</sup>                |
|                  | Annual                    | 52 µg/m <sup>3</sup>                 |
| NO <sub>2</sub>  | Annual                    | 34 µg/m <sup>3</sup>                 |
| CO               | 1-hour                    | 15.3 ppm (17,520 µg/m <sup>3</sup> ) |
|                  | 8-hour                    | 8.4 ppm (9,620 µg/m <sup>3</sup> )   |
| Lead             | Calendar quarter          | 0.28 µg/m <sup>3</sup>               |

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Source: Minnesota Pollution Control Agency, 1986

The closest major source of SO<sub>2</sub>, particulate, and NO<sub>2</sub> emissions to the Elk River station is NSP's Sherco Power Plant, located about 28 kilometers to the west-northwest. To evaluate the relative impact of the Sherco plant within the area of peak impact of the Elk River station, the screening modeling techniques outlined in Section 6.1.3.5 were used to calculate peak concentrations of the Sherco plant over an area within 5 kilometers of the Elk River station, i.e., some 23 to 33 kilometers from the Sherco plant. The Sherco plant operating conditions used in these model calculations were presented in Table 6.1-5. The peak 24-hour average SO<sub>2</sub> impact of Sherco unit Nos. 1 and 2 (currently in operation) over this area was predicted to be at about the 24-hour SO<sub>2</sub> significant impact level of 5 µg/m<sup>3</sup>. This concentration makes up only 7 percent of the 24-hour SO<sub>2</sub> monitor-derived background value of 73 µg/m<sup>3</sup>. The peak 24-hour SO<sub>2</sub> impact of Sherco unit No.3, due for start-up by November 1987, was also predicted to be at about the significant impact level. Therefore, these modeling results show that impacts of the Sherco plant within the area of peak impact of the Elk River station are small and do not by themselves contribute a large percentage of the background concentrations.

#### 6.1.3.9 Air Quality Impact Results

The results of the sequential model calculations for the Elk River generating station are initially presented in Tables 6.1-10 through 6.1-13 as normalized concentrations (C/Q). The highest short-term and annual average concentrations are presented for each year of the five-year modeling period. Peak predicted pollutant concentrations due to criteria pollutant emissions are summarized in Table 6.1-14, as scaled (Q) from the normalized concentrations given in Tables 6.1-10 through 6.1-13. For reference purposes, Table 6.1-14 includes the applicable significant impact levels and ambient air quality standards.

Emissions from the Elk River generating station for one, two and three unit RDF operations and for unit No.3 operating alone on coal are predicted to have an insignificant impact on ambient levels of TSP and

TABLE 6.1-10  
 NORMALIZED HIGHEST GROUND-LEVEL CONCENTRATIONS RESULTING  
 FROM THE ISC SEQUENTIAL MODELING OF ONE BOILER UNIT  
 (Nos. 1 OR 2) AT THE ELK RIVER GENERATING STATION  
 OPERATING ON RDF (500 TPD)

| Averaging<br>Period | Load (%) | Concentration per Modeling Year<br>(micrograms per cubic meter) |      |      |      |      |
|---------------------|----------|-----------------------------------------------------------------|------|------|------|------|
|                     |          | 1973                                                            | 1974 | 1975 | 1976 | 1977 |
| 1-hour              | 100      | 5.46                                                            | 5.74 | 5.90 | 4.92 | 6.22 |
|                     | 75       | 4.43                                                            | 5.23 | 5.36 | 4.74 | 6.96 |
|                     | 50       | 3.99                                                            | 4.81 | 4.88 | 4.33 | 4.79 |
| 3-hour              | 100      | 3.64                                                            | 3.36 | 3.64 | 3.40 | 3.52 |
|                     | 75       | 3.39                                                            | 2.87 | 2.99 | 2.85 | 3.10 |
|                     | 50       | 2.70                                                            | 2.62 | 3.23 | 2.73 | 2.97 |
| 8-hour              | 100      | 2.40                                                            | 2.58 | 2.64 | 2.40 | 2.64 |
|                     | 75       | 2.32                                                            | 2.14 | 2.21 | 2.03 | 2.13 |
|                     | 50       | 1.81                                                            | 2.09 | 1.85 | 1.82 | 1.87 |
| 24-hour             | 100      | 1.54                                                            | 1.56 | 1.60 | 1.34 | 1.38 |
|                     | 75       | 1.28                                                            | 1.25 | 1.28 | 1.35 | 1.20 |
|                     | 50       | 1.00                                                            | 1.17 | 1.09 | 1.13 | 0.99 |
| Annual              | 70       | 0.08                                                            | 0.10 | 0.09 | 0.12 | 0.11 |

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Note: 100% Load is based on an emission rate of 1.0 gram per second.  
 75% Load is based on an emission rate of 0.75 gram per second.  
 50% Load is based on an emission rate of 0.50 gram per second.

Annual average concentrations are from the ISC model in climatological mode.

Source: ERT, 1986.

TABLE 6.1-11  
 NORMALIZED HIGHEST GROUND-LEVEL CONCENTRATIONS RESULTING  
 FROM THE ISC SEQUENTIAL MODELING OF TWO BOILER UNITS  
 (Nos. 1 & 2) AT THE ELK RIVER GENERATING STATION  
 OPERATING ON RDF (1000 TPD)

| <u>Averaging<br/>Period</u> | <u>Load (%)</u> | <u>Concentration per Modeling Year<br/>(micrograms per cubic meter)</u> |             |             |             |             |
|-----------------------------|-----------------|-------------------------------------------------------------------------|-------------|-------------|-------------|-------------|
|                             |                 | <u>1973</u>                                                             | <u>1974</u> | <u>1975</u> | <u>1976</u> | <u>1977</u> |
| 1-hour                      | 100             | 3.18                                                                    | 3.24        | 2.98        | 3.24        | 3.27        |
|                             | 75              | 2.86                                                                    | 2.92        | 2.87        | 2.95        | 2.95        |
|                             | 50              | 2.73                                                                    | 2.87        | 2.95        | 2.46        | 3.11        |
| 3-hour                      | 100             | 2.79                                                                    | 2.51        | 2.36        | 2.24        | 2.50        |
|                             | 75              | 2.40                                                                    | 2.23        | 2.23        | 2.05        | 2.36        |
|                             | 50              | 1.82                                                                    | 1.68        | 1.82        | 1.70        | 1.76        |
| 8-hour                      | 100             | 1.63                                                                    | 1.31        | 1.73        | 1.67        | 1.80        |
|                             | 75              | 1.42                                                                    | 1.54        | 1.54        | 1.41        | 1.66        |
|                             | 50              | 1.20                                                                    | 1.29        | 1.32        | 1.20        | 1.32        |
| 24-hour                     | 100             | 0.90                                                                    | 1.05        | 1.06        | 0.88        | 0.78        |
|                             | 75              | 0.87                                                                    | 0.96        | 1.12        | 0.76        | 0.70        |
|                             | 50              | 0.77                                                                    | 0.78        | 0.80        | 0.67        | 0.69        |
| Annual                      | 70              | 0.05                                                                    | 0.05        | 0.05        | 0.06        | 0.07        |

Note: 100% Load is based on an emission rate of 1.0 gram per second.  
 75% Load is based on an emission rate of 0.75 gram per second.  
 50% Load is based on an emission rate of 0.50 gram per second.

Annual average concentrations are from the ISC model in climatological mode.

Source: ERT, 1986.

TABLE 6.1-12  
 NORMALIZED HIGHEST GROUND-LEVEL CONCENTRATIONS RESULTING  
 FROM THE ISC SEQUENTIAL MODELING OF THREE BOILER  
 UNITS AT THE ELK RIVER GENERATING STATION  
 OPERATING ON RDF (1500 TPD)

| Averaging<br>Period | Load (%) | Concentration per Modeling Year<br>(micrograms per cubic meter) |      |      |      |      |
|---------------------|----------|-----------------------------------------------------------------|------|------|------|------|
|                     |          | 1973                                                            | 1974 | 1975 | 1976 | 1977 |
| 1-hour              | 100      | 2.15                                                            | 2.63 | 2.43 | 2.34 | 2.28 |
|                     | 75       | 2.18                                                            | 2.20 | 1.97 | 2.21 | 2.26 |
|                     | 50       | 1.92                                                            | 1.97 | 1.95 | 1.99 | 1.99 |
| 3-hour              | 100      | 1.88                                                            | 1.65 | 1.80 | 1.64 | 1.61 |
|                     | 75       | 1.91                                                            | 1.71 | 1.66 | 1.56 | 1.65 |
|                     | 50       | 1.61                                                            | 1.50 | 1.49 | 1.38 | 1.59 |
| 8-hour              | 100      | 1.12                                                            | 0.99 | 1.28 | 1.23 | 1.05 |
|                     | 75       | 1.12                                                            | 0.90 | 1.21 | 1.17 | 1.17 |
|                     | 50       | 0.95                                                            | 0.81 | 1.03 | 0.95 | 1.10 |
| 24-hour             | 100      | 0.51                                                            | 0.66 | .065 | 0.62 | 0.53 |
|                     | 75       | 0.58                                                            | 0.71 | 0.70 | 0.61 | 0.53 |
|                     | 50       | 0.58                                                            | 0.64 | 0.66 | 0.51 | 0.47 |
| Annual              | 70       | 0.03                                                            | 0.03 | 0.03 | 0.04 | 0.04 |

Note: 100% Load is based on an emission rate of 1.0 gram per second.  
 75% Load is based on an emission rate of 0.75 gram per second.  
 50% Load is based on an emission rate of 0.50 gram per second.

Annual average concentrations are from the ISC model in climatological mode.

Source: ERT, 1986.

TABLE 6.1-13  
 NORMALIZED HIGHEST GROUND-LEVEL CONCENTRATIONS RESULTING  
 FROM THE ISC SEQUENTIAL MODELING OF ONE BOILER UNIT  
 No. 3 AT THE ELK RIVER GENERATING STATION  
 OPERATING ON COAL

| Averaging<br>Period | Load (%) | Concentration per Modeling Year<br>(micrograms per cubic meter) |      |      |      |      |
|---------------------|----------|-----------------------------------------------------------------|------|------|------|------|
|                     |          | 1973                                                            | 1974 | 1975 | 1976 | 1977 |
| 1-hour              | 100      | 4.19                                                            | 4.16 | 4.30 | 4.24 | 4.22 |
|                     | 75       | 4.20                                                            | 4.47 | 4.59 | 3.84 | 4.67 |
|                     | 50       | 3.67                                                            | 4.28 | 4.41 | 4.11 | 4.64 |
| 3-hour              | 100      | 3.27                                                            | 3.15 | 3.16 | 2.94 | 3.16 |
|                     | 75       | 2.76                                                            | 2.55 | 2.77 | 2.60 | 2.67 |
|                     | 50       | 2.59                                                            | 2.48 | 2.31 | 2.37 | 2.70 |
| 8-hour              | 100      | 1.99                                                            | 2.20 | 2.21 | 2.01 | 2.34 |
|                     | 75       | 1.85                                                            | 1.96 | 2.02 | 1.85 | 2.00 |
|                     | 50       | 1.74                                                            | 1.94 | 1.70 | 1.63 | 1.68 |
| 24-hour             | 100      | 1.25                                                            | 1.36 | 1.38 | 1.06 | 1.02 |
|                     | 75       | 1.19                                                            | 1.18 | 1.21 | 1.03 | 1.07 |
|                     | 50       | 0.97                                                            | 1.11 | 1.02 | 1.05 | 0.93 |
| Annual              | 70       | 0.08                                                            | 0.10 | 0.09 | 0.12 | 0.11 |

Note: 100% Load is based on an emission rate of 1.0 gram per second.  
 75% Load is based on an emission rate of 0.75 gram per second.  
 50% Load is based on an emission rate of 0.50 gram per second.

Annual average concentrations are from the ISC model in climatological mode.

Source: ERT, 1986.

TABLE 6.1-14  
SUMMARY OF THE CALCULATED CRITERIA POLLUTANT CONCENTRATIONS  
RESULTING FROM ELK RIVER GENERATING STATION  
EMISSIONS FOR THE MODELING PERIOD  
1973 - 1977

| <u>Pollutant</u> | <u>Averaging<br/>Period</u> | <u>Case</u>    | <u>Year</u> | <u>Receptor Location</u> |                    | <u>Maximum<br/>Station Impact<br/>(<math>\mu\text{g}/\text{m}^3</math>)</u> | <u>Ambient Criteria (<math>\mu\text{g}/\text{m}^3</math>)</u> |              |              |
|------------------|-----------------------------|----------------|-------------|--------------------------|--------------------|-----------------------------------------------------------------------------|---------------------------------------------------------------|--------------|--------------|
|                  |                             |                |             | <u>Dist (km)</u>         | <u>Dir. (deg.)</u> |                                                                             | <u>Significant Impact<br/>Levels</u>                          | <u>WAAQS</u> | <u>MAAQS</u> |
| Sulfur Dioxide   | 1-hour                      | 1 Unit RDF     | 1977        | 1.5                      | 90                 | 112                                                                         | --                                                            | --           | 1,300        |
|                  |                             | 2 Units RDF    | 1977        | 1.5                      | 100                | 106                                                                         |                                                               |              |              |
|                  |                             | 3 Units RDF    | 1974        | 1.5                      | 100                | 136                                                                         |                                                               |              |              |
|                  |                             | Unit No.3 Coal | 1977        | 1.5                      | 90                 | 401                                                                         |                                                               |              |              |
|                  | 3-hour                      | 1 Unit RDF     | 1973        | 2.0                      | 10                 | 59                                                                          | 25                                                            | 1,300        | 915          |
|                  |                             | 2 Units RDF    | 1973        | 1.5                      | 100                | 90                                                                          |                                                               |              |              |
|                  |                             | 3 Units RDF    | 1973        | 1.5                      | 100                | 98                                                                          |                                                               |              |              |
|                  |                             | Unit No.3 Coal | 1973        | 1.5                      | 100                | 294                                                                         |                                                               |              |              |
|                  | 24-hour                     | 1 Unit RDF     | 1975        | 1.5                      | 100                | 26                                                                          | 5                                                             | 365          | 365          |
|                  |                             | 2 Units RDF    | 1975        | 1.5                      | 100                | 36                                                                          |                                                               |              |              |
|                  |                             | 3 Units RDF    | 1974        | 2.0                      | 10                 | 36                                                                          |                                                               |              |              |
|                  |                             | Unit No.3 Coal | 1975        | 1.5                      | 100                | 124                                                                         |                                                               |              |              |
|                  | Annual                      | 1 Unit RDF     | 1976        | 1.5                      | 135                | 1.9                                                                         | 1                                                             | 80           | 60           |
|                  |                             | 2 Units RDF    | 1977        | 1.5                      | 112                | 2.1                                                                         |                                                               |              |              |
|                  |                             | 3 Units RDF    | 1977        | 1.5                      | 112                | 2.2                                                                         |                                                               |              |              |
|                  |                             | Unit No.3 Coal | 1976        | 1.5                      | 135                | 10.2                                                                        |                                                               |              |              |

TABLE 6.1-14 (Continued)

| Pollutant    | Averaging<br>Period | Case           | Year | Receptor Location |             | Maximum<br>Station Impact<br>( $\mu\text{g}/\text{m}^3$ ) | Ambient Criteria ( $\mu\text{g}/\text{m}^3$ ) |          |          |
|--------------|---------------------|----------------|------|-------------------|-------------|-----------------------------------------------------------|-----------------------------------------------|----------|----------|
|              |                     |                |      | Dist (km)         | Dir. (deg.) |                                                           | Significant Impact<br>Levels                  | NAAQS    | MMAQS    |
| Total        | 24-hour             | 1 Unit RDF     | 1975 | 1.5               | 100         | 3                                                         | 5                                             | 260(150) | 260(150) |
| Suspended    |                     | 2 Units RDF    | 1975 | 1.5               | 100         | 4                                                         |                                               |          |          |
| Particulates |                     | 3 Units RDF    | 1974 | 2.0               | 10          | 4                                                         |                                               |          |          |
|              |                     | Unit No.3 Coal | 1975 | 1.5               | 100         | 5                                                         |                                               |          |          |
|              | Annual              | 1 Unit RDF     | 1976 | 1.5               | 135         | 0.2                                                       | 1                                             | 75       | 75       |
|              |                     | 2 Units RDF    | 1977 | 1.5               | 112         | 0.2                                                       |                                               |          |          |
|              |                     | 3 Units RDF    | 1977 | 1.5               | 112         | 0.2                                                       |                                               |          |          |
|              |                     | Unit No.3 Coal | 1976 | 1.5               | 135         | 0.4                                                       |                                               |          |          |
| Nitrogen     | Annual              | 1 Unit RDF     | 1976 | 1.5               | 135         | 0.9                                                       | 1                                             | 100      | 100      |
| Dioxide      |                     | 2 Units RDF    | 1977 | 1.5               | 112         | 1.0                                                       |                                               |          |          |
|              |                     | 3 Units RDF    | 1977 | 1.5               | 112         | 1.1                                                       |                                               |          |          |
|              |                     | Unit No.3 Coal | 1976 | 1.5               | 135         | 4.7                                                       |                                               |          |          |
| Carbon       | 1-hour              | 1 Unit RDF     | 1977 | 1.5               | 90          | 78                                                        | 2,000                                         | 40,000   | 35,000   |
| Monoxide     |                     | 2 Units RDF    | 1977 | 1.5               | 100         | 74                                                        |                                               |          |          |
|              |                     | 3 Units RDF    | 1974 | 1.5               | 100         | 95                                                        |                                               |          |          |
|              |                     | Unit No.3 Coal | 1977 | 1.5               | 90          | 100                                                       |                                               |          |          |
|              | 8-hour              | 1 Unit RDF     | 1975 | 2.0               | 20          | 30                                                        | 500                                           | 10,000   | 10,000   |
|              |                     | 2 Units RDF    | 1977 | 1.5               | 90          | 41                                                        |                                               |          |          |
|              |                     | 3 Units RDF    | 1975 | 2.0               | 10          | 46                                                        |                                               |          |          |
|              |                     | Unit No.3 Coal | 1977 | 1.5               | 90          | 53                                                        |                                               |          |          |
| Lead         | 3-Month             | 1 Unit RDF     | 1975 | 1.5               | 100         | 0.15                                                      | --                                            | 1.5      | --       |
|              |                     | 2 Units RDF    | 1975 | 1.5               | 100         | 0.21                                                      |                                               |          |          |
|              |                     | 3 Units RDF    | 1974 | 2.0               | 10          | 0.21                                                      |                                               |          |          |
|              |                     | Unit No.3 Coal | 1975 | 1.5               | 100         | <0.01                                                     |                                               |          |          |

Source: ERT, 1986.

CO. Annual average  $\text{NO}_2$  concentrations are calculated to be at or below the significant impact level for one and two unit RDF operations, slightly above this level for three unit operations and appreciably above the level if unit No.3 is operating on coal. Although significant impact levels for lead have not yet been established, the Elk River station impacts are calculated to be less than 15 percent of the ambient 3-month standards. Annual and short-term  $\text{SO}_2$  concentrations are calculated to be above appropriate significant impact levels for all RDF operations and appreciably above these levels if unit No.3 is operating alone on coal.

The Elk River station will emit certain pollutants for which no NAAQS have been established. For regulated non-criteria pollutants, maximum impacts of the station were calculated and the results compared (see Table 6.1-15) to applicable state ambient standards and EPA de minimis levels. The impacts of each regulated non-criteria pollutant emitted from the station are shown to be below these applicable ambient levels. The impacts of other pollutants emitted from the combustion of RDF are considered in Subsection 6.8.

Total projected air quality levels were determined for the criteria pollutants by adding the maximum predicted impacts of the generating station to pollutant background concentrations (highest of the second-highest short-term and highest long-term). Background concentrations were developed from measured air quality data that was previously given in Table 6.1-9. Total ambient concentrations are presented in Table 6.1-16 for comparison with the appropriate NAAQS and MAAQS.

#### Impacts of a 500 TPD Resource Recovery Facility

A 500 tpd resource recovery facility would result in the combustion of RDF in one of the boiler units, Nos. 1 or 2, at the Elk River generating station. The highest of the second-highest 1-hour and 3-hour average  $\text{SO}_2$  concentrations are  $361 \mu\text{g}/\text{m}^3$  and  $308 \mu\text{g}/\text{m}^3$ , respectively. Both of these values are less than thirty-five percent of the limiting standards. The highest of the second-highest 24-hour average  $\text{SO}_2$  concentrations of  $99 \mu\text{g}/\text{m}^3$  is

TABLE 6.1-15  
SUMMARY OF THE CALCULATED REGULATED NON-CRITERIA POLLUTANT  
CONCENTRATIONS RESULTING FROM ELK RIVER GENERATING STATION  
EMISSIONS FOR THE MODELING PERIOD  
1973 - 1977

| Pollutant            | Averaging<br>Period | Case           | Year | Receptor Location |             | Maximum<br>Station Impact<br>( $\mu\text{g}/\text{m}^3$ ) | Ambient Criteria ( $\mu\text{g}/\text{m}^3$ ) |                                    |
|----------------------|---------------------|----------------|------|-------------------|-------------|-----------------------------------------------------------|-----------------------------------------------|------------------------------------|
|                      |                     |                |      | Dist (km)         | Dir. (deg.) |                                                           | MAAQs                                         | EPA De Minimis<br>Monitoring Level |
| Hydrocarbons         | 3-hour              | 1 Unit RDF     | 1973 | 2.0               | 10          | 2                                                         | 160                                           | --                                 |
|                      |                     | 2 Units RDF    | 1973 | 1.5               | 100         | 3                                                         |                                               |                                    |
|                      |                     | 3 Units RDF    | 1973 | 1.5               | 100         | 4                                                         |                                               |                                    |
|                      |                     | Unit No.3 Coal | 1973 | 1.5               | 100         | <1                                                        |                                               |                                    |
| Mercury              | 24-hour             | 1 Unit RDF     | 1975 | 1.5               | 100         | $5.2 \times 10^{-3}$                                      | --                                            | 0.25                               |
|                      |                     | 2 Units RDF    | 1975 | 1.5               | 100         | $7.2 \times 10^{-3}$                                      |                                               |                                    |
|                      |                     | 3 Units RDF    | 1974 | 2.0               | 10          | $7.2 \times 10^{-3}$                                      |                                               |                                    |
|                      |                     | Unit No.3 Coal | 1975 | 1.5               | 100         | $3.1 \times 10^{-4}$                                      |                                               |                                    |
| Beryllium            | 24-hour             | 1 Unit RDF     | 1975 | 1.5               | 100         | $9.6 \times 10^{-7}$                                      | --                                            | 0.0005                             |
|                      |                     | 2 Units RDF    | 1975 | 1.5               | 100         | $1.3 \times 10^{-6}$                                      |                                               |                                    |
|                      |                     | 3 Units RDF    | 1974 | 2.0               | 10          | $1.3 \times 10^{-6}$                                      |                                               |                                    |
|                      |                     | Unit No.3 Coal | 1975 | 1.5               | 100         | $2.3 \times 10^{-5}$                                      |                                               |                                    |
| Fluorides<br>(as HF) | 24-hour             | 1 Unit RDF     | 1975 | 1.5               | 100         | 0.16                                                      | --                                            | 0.25                               |
|                      |                     | 2 Units RDF    | 1975 | 1.5               | 100         | 0.22                                                      |                                               |                                    |
|                      |                     | 3 Units RDF    | 1974 | 2.0               | 10          | 0.22                                                      |                                               |                                    |
|                      |                     | Unit No.3 Coal | 1975 | 1.5               | 100         | $2.8 \times 10^{-4}$                                      |                                               |                                    |
| Hydrogen<br>Chloride | 24-hour             | 1 Unit RDF     | 1975 | 1.5               | 100         | 0.91                                                      | --                                            | --                                 |
|                      |                     | 2 Units RDF    | 1975 | 1.5               | 100         | 1.26                                                      |                                               |                                    |
|                      |                     | 3 Units RDF    | 1974 | 2.0               | 10          | 1.26                                                      |                                               |                                    |
|                      |                     | Unit No.3 Coal | 1975 | 1.5               | 100         | 5.27                                                      |                                               |                                    |

Source: ERT, 1986.

TABLE 6.1-16  
PROJECTED AIR QUALITY VERSUS AMBIENT STANDARDS

| <u>Pollutant</u>                   | <u>Averaging Period</u> | <u>Case</u>       | <u>Elk River<br/>Generating Station<br/>Impact (ug/m<sup>3</sup>)</u> | <u>Measured<br/>Background<br/>(ug/m<sup>3</sup>)</u> | <u>Total Projected<br/>Air Quality<br/>(ug/m<sup>3</sup>)</u> | <u>NAAQS<br/>(ug/m<sup>3</sup>)</u> | <u>MAAQS<br/>(ug/m<sup>3</sup>)</u> |
|------------------------------------|-------------------------|-------------------|-----------------------------------------------------------------------|-------------------------------------------------------|---------------------------------------------------------------|-------------------------------------|-------------------------------------|
| Sulfur Dioxide                     | 1-hour                  | 1 Unit RDF        | 112                                                                   | 249                                                   | 361                                                           | --                                  | 1,300                               |
|                                    |                         | 2 Units RDF       | 106                                                                   |                                                       | 355                                                           |                                     |                                     |
|                                    |                         | 3 Units RDF       | 136                                                                   |                                                       | 385                                                           |                                     |                                     |
|                                    |                         | Unit No.3 on Coal | 401                                                                   |                                                       | 650                                                           |                                     |                                     |
|                                    | 3-hour                  | 1 Unit RDF        | 59                                                                    | 249                                                   | 308                                                           | 1,300                               | 915                                 |
|                                    |                         | 2 Units RDF       | 90                                                                    |                                                       | 339                                                           |                                     |                                     |
|                                    |                         | 3 Units RDF       | 98                                                                    |                                                       | 347                                                           |                                     |                                     |
|                                    |                         | Unit No.3 on Coal | 294                                                                   |                                                       | 543                                                           |                                     |                                     |
|                                    | 24-hour                 | 1 Unit RDF        | 26                                                                    | 73                                                    | 99                                                            | 365                                 | 365                                 |
|                                    |                         | 2 Units RDF       | 36                                                                    |                                                       | 109                                                           |                                     |                                     |
|                                    |                         | 3 Units RDF       | 36                                                                    |                                                       | 109                                                           |                                     |                                     |
|                                    |                         | Unit No.3 on Coal | 124                                                                   |                                                       | 197                                                           |                                     |                                     |
|                                    | Annual                  | 1 Unit RDF        | 1.9                                                                   | 13                                                    | 14.9                                                          | 80                                  | 60                                  |
|                                    |                         | 2 Units RDF       | 2.1                                                                   |                                                       | 15.1                                                          |                                     |                                     |
|                                    |                         | 3 Units RDF       | 2.2                                                                   |                                                       | 15.2                                                          |                                     |                                     |
|                                    |                         | Unit No.3 on Coal | 10.2                                                                  |                                                       | 23.2                                                          |                                     |                                     |
| Total<br>Suspended<br>Particulates | 24 Hour                 | 1 Unit RDF        | 3                                                                     | 136                                                   | 139                                                           | 260(150)                            | 260(150)                            |
|                                    |                         | 2 Units RDF       | 4                                                                     |                                                       | 140                                                           |                                     |                                     |
|                                    |                         | 3 Units RDF       | 4                                                                     |                                                       | 140                                                           |                                     |                                     |
|                                    |                         | Unit No. 3 Coal   | 5                                                                     |                                                       | 141                                                           |                                     |                                     |
|                                    | Annual                  | 1 Unit RDF        | 0.2                                                                   | 52                                                    | 52.2                                                          | 75                                  | 75                                  |
|                                    |                         | 2 Units RDF       | 0.2                                                                   |                                                       | 52.2                                                          |                                     |                                     |
|                                    |                         | 3 Units RDF       | 0.2                                                                   |                                                       | 52.2                                                          |                                     |                                     |
|                                    |                         | Unit No. 3 Coal   | 0.4                                                                   |                                                       | 52.4                                                          |                                     |                                     |

TABLE 6.1-16 (Continued)

| <u>Pollutant</u>   | <u>Averaging<br/>Period</u> | <u>Case</u>       | <u>Elk River<br/>Generating Station<br/>Impact (<math>\mu\text{g}/\text{m}^3</math>)</u> | <u>Measured<br/>Background<br/>(<math>\mu\text{g}/\text{m}^3</math>)</u> | <u>Total Projected<br/>Air Quality<br/>(<math>\mu\text{g}/\text{m}^3</math>)</u> | <u>NAAQS<br/>(<math>\mu\text{g}/\text{m}^3</math>)</u> | <u>MAAQS<br/>(<math>\mu\text{g}/\text{m}^3</math>)</u> |
|--------------------|-----------------------------|-------------------|------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|----------------------------------------------------------------------------------|--------------------------------------------------------|--------------------------------------------------------|
| Carbon<br>Monoxide | 1-Hour                      | 1 Unit RDF        | 78                                                                                       | 17,620                                                                   | 17,598                                                                           | 40,000                                                 | 35,000                                                 |
|                    |                             | 2 Units RDF       | 74                                                                                       |                                                                          | 17,594                                                                           |                                                        |                                                        |
|                    |                             | 3 Units RDF       | 95                                                                                       |                                                                          | 17,615                                                                           |                                                        |                                                        |
|                    |                             | Unit No. 3 Coal   | 100                                                                                      |                                                                          | 17,620                                                                           |                                                        |                                                        |
|                    | 8-Hour                      | 1 Unit RDF        | 30                                                                                       | 9,620                                                                    | 9,650                                                                            | 10,000                                                 | 10,000                                                 |
|                    |                             | 2 Units RDF       | 41                                                                                       |                                                                          | 9,661                                                                            |                                                        |                                                        |
|                    |                             | 3 Units RDF       | 46                                                                                       |                                                                          | 9,666                                                                            |                                                        |                                                        |
|                    |                             | Unit No. 3 Coal   | 53                                                                                       |                                                                          | 9,673                                                                            |                                                        |                                                        |
| Lead               | 3-Month*                    | 1 Unit RDF        | 0.15                                                                                     | 0.28                                                                     | 0.43                                                                             | 1.5                                                    | --                                                     |
|                    |                             | 2 Units RDF       | 0.21                                                                                     |                                                                          | 0.49                                                                             |                                                        |                                                        |
|                    |                             | 3 Units RDF       | 0.21                                                                                     |                                                                          | 0.49                                                                             |                                                        |                                                        |
|                    |                             | Unit No.3 on Coal | <0.01                                                                                    |                                                                          | 0.28                                                                             |                                                        |                                                        |

\*Maximum predicted 24-hour value is given as a conservative estimate of the 3-month average value.

Source: ERT, 1986.

less than thirty percent of the limiting standard. The highest annual  $\text{SO}_2$  impact of  $14.9 \mu\text{g}/\text{m}^3$  is about twenty-five percent of the limiting standard. Total concentrations of  $\text{NO}_2$  and lead are about thirty-five and twenty-nine percent of the standards, respectively.

#### Impacts of a 1000 TPD Resource Recovery Facility

A 1000 tpd facility would result in the combustion of RDF in two of the boiler units, Nos. 1 and 2, at the generating station. The highest of the second-highest 1-hour and 3-hour average  $\text{SO}_2$  concentrations are  $355 \mu\text{g}/\text{m}^3$  and  $339 \mu\text{g}/\text{m}^3$ , respectively. Both of these values are less than forty percent of the limiting standards. The highest of the second-highest 24-hour average  $\text{SO}_2$  concentration of  $109 \mu\text{g}/\text{m}^3$  is less than thirty percent of the limiting standard. The highest annual  $\text{SO}_2$  impact of  $15.1 \mu\text{g}/\text{m}^3$  is about twenty-five percent of the limiting standard. Total concentrations of  $\text{NO}_2$  and lead are each about thirty-five percent of the standards.

#### Impacts of a 1500 TPD Resource Recovery Facility

A 1500 tpd resource recovery facility would result in the combustion of RDF in three of the boiler units at the generating station. The highest of the second-highest 1-hour and 3-hour average  $\text{SO}_2$  concentrations are  $385 \mu\text{g}/\text{m}^3$  and  $347 \mu\text{g}/\text{m}^3$ , respectively. Both of these values are less than forty percent of the limiting standards. The highest of the second-highest 24-hour average  $\text{SO}_2$  concentration of  $109 \mu\text{g}/\text{m}^3$  is less than thirty percent of the limiting standard. The highest annual  $\text{SO}_2$  impact of  $15.2 \mu\text{g}/\text{m}^3$  is about twenty-five percent of the limiting standard. Total concentrations of  $\text{NO}_2$  and lead are each about thirty-five percent of the standards.

#### Impacts of a 2400 TPD Resource Recovery Facility

A 2400 tpd facility would result in the combustion of RDF in all three of the boiler units at the Elk River generating station.

However, the Elk River station could not burn all the RDF processed at this design capacity. Thus, the excess RDF would be burned in other regulated boilers. For this case, the impacts would be similar to the impacts of a 1500 tpd facility.

#### Impacts of Elk River Unit No.3 Burning Coal

For a 500 tpd or 1000 tpd resource recovery facility, Elk River unit No.3 would continue to fire coal. For a 1500 tpd facility, unit No.3 would also be converted to fire RDF, but would still retain its capability of burning coal. The highest of the second-highest 1-hour and 3-hour average  $\text{SO}_2$  concentrations when unit No.3 alone is burning coal are  $650 \mu\text{g}/\text{m}^3$  and  $543 \mu\text{g}/\text{m}^3$ , respectively. Both of these values are less than sixty percent of the limiting standard. The highest of the second-highest 24-hour average  $\text{SO}_2$  concentration of  $197 \mu\text{g}/\text{m}^3$  is less than fifty-five percent of the limiting standard. The highest annual  $\text{SO}_2$  impact of  $23.2 \mu\text{g}/\text{m}^3$  is about thirty-nine percent of the limiting standard. Total concentrations of  $\text{NO}_2$  are also about thirty-nine percent of the standard, whereas total lead concentrations are at background levels of about twenty percent of the standard.

## 6.2 Water Quality

### 6.2.1 Surface Water Impacts

Construction of the proposed resource recovery facility is not anticipated to result in any significant, long-term impacts to local hydrology. Development of the 500-tpd facility is expected to increase the impervious surface of the site by approximately 8 acres (due to roof areas and pavement), while development of the 1000-tpd or 1500-tpd facility would increase impervious surface area by approximately 11 acres. Using the SCS method of surface runoff calculation, the

increased impervious surface area would enlarge stormwater runoff volumes by the following amounts:

| <u>Recurrence Interval*</u> | <u>Existing Runoff Volumes</u> | <u>Postdevelopment Runoff Volumes for 500-tpd Facility</u> | <u>Postdevelopment Runoff Volumes for 1000-tpd or 1500-tpd Facility</u> |
|-----------------------------|--------------------------------|------------------------------------------------------------|-------------------------------------------------------------------------|
| 10-year                     | 5.7 acre-feet                  | 6.5 acre-feet                                              | 6.8 acre-feet                                                           |
| 25-year                     | 6.8 acre-feet                  | 7.7 acre-feet                                              | 8.2 acre-feet                                                           |
| 50-year                     | 8.5 acre-feet                  | 9.4 acre-feet                                              | 9.9 acre-feet                                                           |

\*Based on 24-hour design storm.

This represents an all to 14 percent increase in flows for the single-line 500-tpd facility, or a 16 to 21 percent increase in flows for the two-line facility. Any impacts of these increased flows would be eliminated by collecting runoff in the site drainage system. Thus, discharge rates would be controlled to prevent exceedance of downstream storm drainage capacity. The wetlands immediately down-gradient of the site further reduce the potential for local hydrologic impacts. Given the small increase in runoff volume, there would be no significant impacts expected upon the hydrology of the Mississippi River.

Water quality impacts due to contact with stored waste materials would be unlikely since the tipping and storage areas would be fully enclosed. Outside surface runoff collected from the impervious areas would be routed through oil and debris traps prior to discharge. These facilities would reduce transport of contaminants in surface runoff. Development of the facility is not expected to impact the water quality of the Mississippi River.

During operation of the proposed RDF facility, process wastewaters would be generated by washdowns of refuse-handling equipment and the tipping floor in the receiving building. According to NSPC (letter from J.R. Alders dated 17 March 1986), the volume of washdown wastewater anticipated is 3600 gpy, 5400 gpy, or 7200 gpy for the 500 tpd, 1000 tpd, or 1500 tpd facilities, respectively. This

water would most likely be collected in a sump, pumped to a tanker truck, transported to the Elk River wastewater treatment plant, and discharged to a lift station just in front of the plant headworks. The addition of the washdown wastewater would not significantly affect the TSS and BOD5 levels of the raw wastewater entering the municipal treatment facility. The quantity and quality of the RDF process wastewater is not expected to impact the operation of the treatment plant, the quality of the sludge, or the quality of the treated effluent.

Another possibility would be to collect and treat washdown water on site. Effluent would be of such quality as to comply with the applicable discharge limitations required by MPCA. Thus any potential impacts would be thoroughly identified and minimized by proper treatment.

Construction of the facility is not expected to impact surface water quality. Soil erosion and sedimentation would be minimal due to the relatively flat site topography. Disturbed areas would be paved or landscaped immediately following completion of work. If necessary, appropriate mitigative measures such as mulch, haybales, silt fences, and diversion ditches would be employed. Dewatering may be required during construction of the apron conveyor pits in the receiving building. If so, discharge rates would be controlled to minimize temporary impacts to local drainage facilities.

#### 6.2.2 Ground-water Impacts

##### Ground Water

Either the Mt. Simon-Hinckley aquifer or the glacial drift would supply water to the proposed resource recovery facility. The pump discharge would be routed to a 4500-gallon hydropneumatic tank for distribution to the potable water system. The well would also supply

water to a 150,000-gallon storage tank for fire protection. NSPC predicts the following water usage rates:

|                                                                       | <u>500-tpd</u><br><u>(gpy)</u> | <u>1000-tpd</u><br><u>(gpy)</u> | <u>1500-tpd</u><br><u>(gpy)</u> |
|-----------------------------------------------------------------------|--------------------------------|---------------------------------|---------------------------------|
| Domestic Use                                                          | 175,000                        | 320,000                         | 415,000                         |
| Tipping Floor Washdown                                                | 3,600                          | 5,400                           | 7,200                           |
| Leakage, Evaporation, and<br>Testing of the Fire<br>Protection System | 400                            | 400                             | 400                             |
| Total Usage                                                           | 179,000                        | 325,800                         | 422,600                         |

The Minnesota DNR requires a Water Appropriation Permit for ground-water withdrawals exceeding 1,000,000 gallons per year or 10,000 gallons per day (gpd). The facility would not require an Appropriation Permit provided the maximum withdrawal rate of 10,000 gpd is not exceeded while filling the fire protection storage tank. During normal plant operations, the water usage rate would be well below the maximum allowed, unpermitted withdrawal rate, even for the 1500 TPD facility.

Development of the proposed facility would have no significant impacts on regional ground-water availability. Drawdown due to the water supply well would be minimal since the water usage rate is a small fraction of the probable aquifer yield. Buildings, roads, and parking areas would cover approximately 24 percent or 32 percent of the site following construction of the facility. This increase in impervious surface area would reduce on-site infiltration and recharge of the glacial drift aquifer. However, the surficial aquifer is recharged throughout a much larger area than the site, therefore the regional impacts of locally reduced recharge would also be minor.

Preliminary soil borings on the site encountered the water table fifteen feet below the ground surface. If water is encountered during excavation for the apron conveyor pits in the receiving building, dewatering may be necessary. This could locally affect ground-water table elevations but only on a temporary basis.

The potential for degradation of ground-water quality during daily facility operation would be minimal. All solid waste handling, residue stockpiling, and washdown wastewater generation would occur above ground, in enclosed areas.

While fire fighting is expected to be a very infrequent occurrence at the proposed facility, an emergency could result in the rapid release of several thousand gallons of water (the first flush), which is typically the most contaminated, would be collected by the interior drainage system and stored with the washdown wastewater. It would then be transported to the Elk River Wastewater Treatment Plant. Additional fire-fighting discharge would either become surface runoff or ground-water recharge depending on the location of the fire. The quality of this additional discharge would be higher than that of the first flush. The impacts of fire-fighting on surface water and ground water are expected to be infrequent and temporary.

The on-site system would treat all domestic wastewater flows from within the RDF buildings, including wastes from sinks, showers and toilets. Wastewater would be applied to the land via subsurface leaching. A properly designed, constructed, and maintained subsurface adsorption system generally should perform reliably over a long period of time with little attention. This is because of the large natural capacity of the soil to assimilate wastewater pollutants. The average daily flow to the system would be approximately 675 gpd, 875 gpd, or 1150 gpd for the 500 tpd, 1,000 tpd, or 1,500 tpd facilities, respectively. Based on preconstruction borings, the soils can accommodate this flow without any significant impacts to ground-water quality. Special construction of the leaching field may be necessary to assure that the percolation rate is sufficiently low to insure adequate treatment of septic tank effluent in the field.

### 6.2.3 Mitigation of Water Quality Impacts

#### Surface Water

Development of the proposed facility would increase impervious surface area on the site, resulting in increased runoff and potential

degradation of water quality. The impacts of increased stormwater runoff volume could be mitigated by the construction of a surface drainage system. The drainage system would collect surface runoff and would provide a controlled discharge that would not exceed downstream storm drainage capacity. The drainage system would also incorporate oil and debris traps, thus eliminating the water quality impacts of development.

The proposed RDF facility would generate process wastewaters from tipping floor washdown. The volumes are very small (from 3600 to 7200 gallons per year) and intermittent. All of these wastewaters will be collected and treated at the Elk River Municipal Wastewater Treatment Plant. This flow and loading of pollutants will not adversely impact operations, sludge quality, or effluent quality of the treatment plant. Thus, treatment of the wastewaters constitutes a mitigative measure to eliminate impacts on surface and/or ground water.

During construction immediate revegetation or paving of disturbed areas would minimize potential erosion and water quality impacts. If necessary, additional mitigative measures, including the use of hay bales, silt fences, diversion ditches, and temporary detention ponds, could be employed to eliminate the short-term impacts of construction.

#### Ground Water

The facility will have no significant long-term impacts on regional ground-water availability or quality. Water withdrawal rates will be minimal and domestic wastewater will be treated in an on-site septic system prior to subsurface discharge. Therefore, no additional mitigation measures are required.

### 6.3 Solid Waste - Impacts

#### 6.3.1 Introduction

The curtailing of landfilling as the primary means for Anoka County solid waste disposal and its replacement with resource recovery

would have major impacts on the solid waste stream. Currently, solid waste is collected and disposed of in three landfills. Eventually landfilled wastes decompose, but in the interim generate and release leachate to the soil and to ground and surface water resources. Landfill space needed for disposal of Anoka County solid waste is on the order of 350,000 c.y. per year, increasing to 409,700 c.y. acre-feet/year over a 16-year period. The overall impact of the proposed RDF facility would be to substantially reduce landfill space requirements and change the characteristics of the wastes to be disposed. If the capacity of the facility increases from 500 to 1000 or 1500 tpd, then landfill abatement would be significantly increased. The following sections describe the impacts of the RDF facility on the waste stream, handling and disposal methods, land use and environmental impacts.

#### 6.3.2 Waste Stream

##### 6.3.2.1 Municipal Solid Waste Volume

As stated in Section 5.3.1, the current estimated waste generated in Anoka County amounts to 175,300 tons per year, which is expected to increase to 205,115 tons by the year 2000. The Metropolitan Council publication "Solid Waste Management Development Guide/Policy Plan," dated March 1985, indicates that approximately 5 percent of the waste stream will be eliminated by waste reduction programs, primarily recycling and composting. It is also planned that a waste stream volume reduction from source separation programs of from 2 to 15 percent (averaging 10 percent over a 16-year period) will occur. The previously described document also indicates that the remaining 80 percent of the waste stream will be diverted to a centralized processing facility(ies) by 1990.

The proposed RDF facility will not affect the estimated waste volume generated by the County, but will dramatically reduce the estimated volumes of wastes to be landfilled.

If the RDF facility processes waste at a rate of 1000 TPD or 1500 TPD, then additional amounts of solid waste would be processed at the facility.

#### 6.3.2.2 Waste Categories

The overall objective of the proposed RDF facility would be the conversion of mixed municipal solid waste to a variety of components, for the purpose of energy conversion, recycling materials, and minimizing the need for landfills. Traditionally, municipal solid waste is collected and transported to a landfill in its "as is" state, then compacted and buried. Some recycling and waste reduction efforts are often in place to reduce the overall volume. The proposed RDF facility will be designed to reduce the amount of solid waste to be landfilled. Waste reduction and source separation (recycling) efforts would be expected to achieve about 20 percent reduction in the volume of the municipal solid waste transported to the RDF facility for "processing" or "preparation". Figure 4-3 is a generalized flow diagram of processing, use, and final disposition of the mixed municipal waste.

Upon arriving at the RDF facility, the mixed solid waste undergoes an initial separation process. This initial process removes bulky white goods, oversized wood, tires, brush, leaves, household hazardous waste, and other rejects. This process results in "oversize", and "process rejects". Solid waste in the next stage is converted to RDF, except for residue (glass, aluminum, non-ferrous metal, heavy organics), magnetics, (ferrous) and process rejects (grit, glass, stones, compost, non-ferrous metals). The processed RDF is used as a fuel to generate energy, and the remaining waste material from the combustion is ash which is subsequently landfilled (bottom and fly). The facility will be designed so that not more than 25 percent of the processible waste will result in process rejects, ash or other waste products that would require landfilling.

Table 6.3-1 summarizes the process, and identifies each waste category and the typical waste associated with each category. The solid waste stream is comprised of four general processes including initial source separation. These general processes result in seven different waste categories. The various types of waste except for RDF are then either recycled, composted, landfilled, or transported and treated. Ash from RDF combustion is included in the waste categorization.

TABLE 6.3-1  
DISPOSITION OF SOLID WASTE VIA RDF FACILITY

| <u>Process</u>                                                  | <u>Waste Category</u> | <u>Waste</u>                                                                                        | <u>Recycle</u>  | <u>Compost</u> | <u>Landfill</u>       | <u>Transport/Treat</u> |
|-----------------------------------------------------------------|-----------------------|-----------------------------------------------------------------------------------------------------|-----------------|----------------|-----------------------|------------------------|
| Source separation<br>(curbside collection,<br>drop-off centers) | Recyclables           | Yard waste<br>paper, glass, metal                                                                   | X               | X              |                       |                        |
| RDF Facility<br>Initial separation                              | Oversize              | White goods<br>Wood, tires<br>Brush, leaves<br>Non-household quantities<br>of hazardous waste       | X<br>X (to RDF) | X              | X                     | X                      |
|                                                                 | Process<br>rejects    | Steel banding<br>Baling wire<br>Solvents<br>Stumps, logs<br>Propane tanks<br>Gasoline<br>Auto parts | X               |                | X<br>X<br>X<br>X<br>X | X<br>X                 |
| RDF Facility<br>Screening                                       | Residue               | Glass<br>Aluminum<br>Non-ferrous metals<br><br>Heavy organics                                       | X<br>X<br>X     | X (1)          | X (2)<br>X            |                        |
|                                                                 | Magnetics             | Ferrous metals                                                                                      | X               |                | X (2)                 |                        |
|                                                                 | Process<br>rejects    | Grit, glass, stones<br>Non-ferrous metals                                                           |                 |                | X<br>X                |                        |
| Combustion                                                      | Ash                   | Bottom ash & fly ash                                                                                |                 |                | X                     |                        |

- Notes: 1. The heavy fraction may be composted with a suitable nitrogen source and land-spread after stabilization.  
2. Some reclaimed recyclables, such as ferrous metal, may require landfilling if adequate markets are not available.

### 6.3.3 Waste Handling and Disposal Methods

#### 6.3.3.1 Landfilling

Municipal solid waste, a mixture of a wide variety of materials and sizes, is commonly spread, compacted and covered with soil. Typically, compaction results in a high void ratio. One result is the rapid use of landfill space. The capacity available at a given landfill site is consumed more rapidly than with RDF ash and residue landfill. Landfilling of ash and process rejects is considerably less since the overall waste stream volume is reduced by at least 75 percent. In addition, the texture of ash is uniform and can be spread, compacted and covered more easily, resulting in a lower void ratio and more effective use of space than the landfilling of untreated solid waste. Although process rejects would vary in size, the overall composition and texture would be relatively uniform.

Approximately 40 percent of the RDF ash would be bottom RDF ash, and the remaining 60 percent fly ash. The approximate textural size of the bottom ash is historically 100 percent less than 5-inch size, 98 percent less than 1-1/2-inch size, and 50 percent less than 1/4-inch. Fly ash is considerably finer and has 80 percent less than 30 microns, 60 percent less than 20 microns, and 40 percent less than 10 microns. An increase in facility size would not significantly change the landfilling characteristics of the ash and residue.

#### 6.3.3.2 Recycling/Energy Conversion/Waste Reduction

Planned waste reduction and source separation programs involving municipal solid waste are estimated to result in a 20 percent volume reduction. Over and above this waste reduction the RDF facility includes provisions for recovery of recyclable material and the conversion of the RDF to energy. If heavy fraction co-composting measures are implemented, further useful materials will be reclaimed as a soil amendment. Table 6.3-2 presents a generalized comparison of the impact of the RDF facility on the Anoka County waste stream when compared to current conditions without an RDF facility. The table

TABLE 6.3-2  
GENERALIZED COMPARISON OF RDF FACILITY  
IMPACT ON WASTE STREAM IN ANOKA COUNTY  
500 TON/DAY RDF GENERATION RATE

|                                                           | <u>Re-Use/Recycling<br/>with Landfill*</u> | <u>Re-Use/Recycling<br/>RDF Facility &amp; Landfill*</u> |
|-----------------------------------------------------------|--------------------------------------------|----------------------------------------------------------|
| Total tonnage estimate for 1990                           | 190,000                                    | 190,000                                                  |
| Waste reduction <sup>(1)</sup>                            | -1,900                                     | -1,900                                                   |
| 15% Reduction for Source Separation <sup>(2)</sup>        | -28,500                                    | -28,500                                                  |
| 7% Reduction for ferrous recovery                         | 0                                          | -13,300                                                  |
| 5% Waste unacceptable at RDF facility<br>(to landfill)    |                                            | -9,500                                                   |
| Waste to be converted to RDF, rejects,<br>residue and ash | 0                                          | 136,800                                                  |
| Waste tonnage to be converted to<br>RDF (75%)             | 0                                          | 102,600                                                  |
| Process rejects, ash, residue to be<br>landfilled         | 0                                          | 34,200                                                   |
| Total remaining for landfilling                           | 159,600                                    | 43,700 <sup>(3)</sup>                                    |

NOTE: Comparison based on annual projected total tonnage for 1990.

\*All units are tons per year.

(1) The goal for waste reduction is 5%; 1% is reasonably expected.

(2) Assuming municipal leaf composting and recycling programs.

(3) Includes waste unacceptable at RDF facility.

Source: MPCA Staff, 1986.

presents waste tonnage for one representative year (1990). The table indicates that with the RDF facility, the tonnage received at landfills could be reduced from 152,000 per year without the RDF facility to 34,200 with the RDF facility, approximately 65-75 percent reduction (by weight). The table also indicates that 104,000 tons per year of solid waste will be converted to energy.

#### 6.3.4 Land Use

##### 6.3.4.1 Landfill Site Utilization

The impact of the proposed RDF facility on landfill site utilization would be to substantially reduce the area needed for placement of solid wastes. It is estimated that under present conditions, with a fully operational landfill, approximately 80 percent of the waste stream is landfilled. With an RDF facility, as little as 25-35 percent of the waste stream would be landfilled. With heavy fraction co-composting the percentage for landfilling would be less. The reduction would result in an extended use of landfill area than conventional landfilling under current conditions. The result would be longer site life, less volume received on an annual basis, and simpler compacted cell construction. The final grading contours of the site would occur at a much later date than under conventional solid waste landfill disposal.

The impact on landfill site utilization will vary according to the actual size of the facility. Landfill space will be consumed in direct proportion to facility size. Table 6.3-3 presents a comparison of impacts on landfill utilization depending on facility size. This table indicates that approximately 72,600 c.y., 145,200 c.y., and 3,484,000 c.y. will be needed respectively for the 500, 1000 and 1500 tpd facilities. Table 6.3-3 also shows the comparison to the four typical existing landfills in order to provide an indicator of the RDF facility impact on the site life of each landfill. The cubic yards remaining is based on 1984 unprocessed solid waste volumes received and the projected site life, based on MPCA data. This projection results in a total of 4,756,700 c.y. left for all four landfills. For a 500 tpd and

TABLE 6.3-3  
COMPARISON OF IMPACTS ON LANDFILL UTILIZATION  
ACCORDING TO RDF FACILITY INPUT RATES

|    |                                                                            |             |             |              |
|----|----------------------------------------------------------------------------|-------------|-------------|--------------|
| 1) | RDF input rate                                                             | 500 tpd*    | 1000 tpd*   | 1500 tpd*    |
| 2) | Less 7 percent for<br>ferrous recovery                                     | -35 tpd     | -70 tpd     | -105 tpd     |
| 3) | Total waste remaining                                                      | 465 tpd     | 930 tpd     | 1395 tpd     |
| 4) | Tons/year for further<br>processing                                        | 145,080     | 290,100     | 435,240      |
| 5) | 25 percent of waste<br>remaining to become ash<br>and residue (4)          | 36,270 tons | 72,540 tons | 108,810 tons |
| 6) | Cubic yards needed per year<br>at landfill to receive<br>above tonnage (5) | 72,600      | 145,200     | 217,800      |
| 7) | Cubic yards needed for<br>16-year operation                                | 1,116,400   | 2,322,700   | 3,484,100    |

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\*Processible waste received at plant (annual average).

Source: ERT, 1986.

1000 tpd facilities, the site life at Elk River is adequate for the full 16 years involved in the projection. The East Bethel site would have capacity up to 10 years for the 500 tpd facility. The Anoka Municipal and Yonak would not be adequate sites for long-term ash and residue landfilling. Table 6.3-3 indicates that a minimum of 1,161,400 c.y. will be needed for the 500 tpd facility, and a maximum of 3,484,000 c.y. for the 1500 tpd facility. The total projected acre/ft remaining and the Elk River, East Bethel, and Yonak landfills is approximately 3,540,500 c.y., using 1984 data. The total acre/ft therefore, is subject to a reduction in proportion to the number of years before the facility is actually operational.

Under optimal conditions it appears that three landfills could accommodate the residues and ash for all three facility sizes over a 16-year period. However, many variables must be considered that will alter these projections. These include the following:

- Closing of one or more landfills due to environmental contamination.
- Expansion of one or more of the landfills.
- The volume of waste landfilled from the beginning of 1985 to the time the facility is operational.
- The efficiency of the landfill operation.
- The methods previously used to calculate remaining site life.
- MPCA regulations for leachate collection and treatment of RDF facility waste leachate.

The overall impact on each of the four landfills is as follows:

Anoka Municipal - it is expected that this landfill will be filled to capacity prior to the operation of an RDF facility.

Elk River - the present projected site life of "5 plus" years is expected to increase to as much as 37 years if a 500 tpd facility is installed. For a 1000 tpd and 1500 tpd facility the site life is 18 and 12 years.

East Bethel - the 1500 tpd facility would shorten the site life from 5 to 3 years. The 1000 tpd facility would nearly end existing site life. The 500 tpd facility would double the present site life.

Yonak - the remaining site life is inadequate for all three rate of input.

#### 6.3.4.2 Completed Landfill Reuse

A completed solid waste landfill consisting of compacted municipal solid waste typically has limited possibilities for reuse. These are often open space uses due to structural instability, and gas generation resulting from decomposing refuse. A landfill constructed from RDF ash and process rejects has considerably less putrescible matter. Due to its more uniform textural characteristics, the waste from the RDF facility, if placed and compacted properly, will result in a more stable mass which has a higher potential for reuse, (i.e., construction of light structures).

#### 6.3.5 Environmental Impacts

##### 6.3.5.1 Water Resources and Soils

The overall impact of placing RDF ash and process rejects on landfills, rather than unclassified municipal solid waste will be to improve the quality of leachate. Studies by others have revealed that mono-disposal of resource recovery ash is preferable to co-disposal with municipal solid waste. The pH of leachate from ash is generally higher (alkaline) than leachate from municipal solid waste (slightly acidic). In addition, less iron, manganese, calcium, magnesium, barium, sodium and potassium are leached from ash landfills. The overall impact of ash landfilling with or without leachate collection and treatment systems is to show an improvement in leachate quality, therefore creating less of a danger to adjacent surface and ground water resources and soils if a breakout occurs within a secure landfill.

Relative to the chemical and toxicity characteristics of resource recovery ash, a variety of analyses have been performed by others on a nation-wide basis to indicate that resource recovery wastes are not classified as a hazardous waste, according to EP toxicity analyses.

Table 6.3-4 presents an average elemental breakdown of four resource recovery zones. This information indicates that the primary components are silicon, calcium, iron, and aluminum, all of which are common elements within the environment and do not include EP toxic metals.

Table 6-3-5 presents the results of EP toxicity metal analyses for four different resource recovery wastes. The table indicates that typical RDF, process rejects, and bottom ash do not exceed the criteria for EP toxic metals. However, levels of cadmium and lead are exceeded for fly ash. The data source report indicates that by combining bottom and fly ash before landfilling a total mixture analyses would indicate that the EP toxicity limits would not be exceeded. RDF ash will be characterized chemically, using water and acid leach testing, to determine whether it can be deposited in contact with mixed municipal waste. Thus far, experience in Minnesota has shown that incinerator ash must be disposed of in a separate, special cell of a mixed municipal solid waste landfill, or in a separately permitted ash-only facility.

Leachate from decomposing municipal solid waste in a landfill has widely varying characteristics and may or may not be classified as hazardous. Landfilled resource recovery waste that is subject to leaching is of generally non-toxic nature, according to EP toxicity criteria. The increasing of the facility size and the subsequent volume increase in waste to be landfilled will not alter the waste characteristics and the impact on water resources and soils, if it is placed into a landfill with a leachate collection and treatment system.

#### 6.4 Land Use and Zoning

##### 6.4.1 Land Use

The proposed industrial activity will be located in an I-1 Light Industrial district. To the immediate west of the site is the

TABLE 6.3-4  
AVERAGE ELEMENTAL CONCENTRATIONS OF  
RESOURCE RECOVERY ASH (RDF)

| <u>Element</u> | <u>Concentration</u><br><u>mg/kg</u> |
|----------------|--------------------------------------|
| Silicon        | 78,000                               |
| Calcium        | 68,500                               |
| Iron           | 60,750                               |
| Aluminum       | 53,000                               |
| Sodium         | 13,300                               |
| Titanium       | 12,280                               |
| Magnesium      | 9,700                                |
| Potassium      | 8,580                                |
| Phosphorous    | 2,850                                |
| Barium         | 1,250                                |
| Copper         | 1,230                                |
| Manganese      | 1,230                                |
| Chromium       | 590                                  |
| Strontium      | 290                                  |
| Molybdenum     | 230                                  |
| Vanadium       | 35                                   |

The following elemental concentrations were below the ranges shown:

|           |               |
|-----------|---------------|
| Silver    | <17 to <33    |
| Arsenic   | <620 to <1200 |
| Beryllium | <1 to 2.4     |
| Cadmium   | <8 to <17     |
| Cobalt    | <11 to <91    |
| Nickel    | <96 to <200   |
| Lead      | <230 to <470  |
| Antimony  | <120 TO <260  |
| Selenium  | <420 to <780  |

Source: C.W. Francis, "Leaching Characateristics of Resource Recovery Ash in Municipal Waste Landfills" prepared by Oak Ridge National Laboratory, DOE Project No. ERD-83-289, Publication No, 2456, Dec. 31, 1984. Table 1.

TABLE 6.3-5  
EP TOXICITY ANALYSES OF  
RESOURCE RECOVERY WASTES

| <u>Parameter</u> | <u>Material</u> |                                  |                             |                          |                                     |
|------------------|-----------------|----------------------------------|-----------------------------|--------------------------|-------------------------------------|
|                  | <u>RDF</u>      | <u>Process</u><br><u>Rejects</u> | <u>Bottom</u><br><u>Ash</u> | <u>Fly</u><br><u>Ash</u> | <u>EP Toxicity</u><br><u>Limits</u> |
| Arsenic          | BDL             | BDL                              | BDL                         | BDL                      | 5.0                                 |
| Barium           | .37             | .027                             | .131                        | .126                     | 100.0                               |
| Cadmium          | .004            | .091                             | .018                        | 2.44                     | 1.0                                 |
| Chromium         | .060            | .071                             | .038                        | .066                     | 5.0                                 |
| Lead             | .083            | .67                              | .203                        | 12.2                     | 5.0                                 |
| Mercury          | .004            | .0004                            | BDL                         | .0007                    | 0.2                                 |
| Selenium         | BDL             | BDL                              | BDL                         | .010                     | 1.0                                 |
| Silver           | BDL             | BDL                              | .001                        | .005                     | 5.0                                 |

NOTE: All values are in mg/l.

Source: Rigo, H. Gregor. State of the Knowledge Report on the Disposal of Incinerator Ash, Rigo & Associates, Inc. Duxbury, Mass. 1982.

LeFebvre & Sons, Inc. Mobil service station. Development of the proposed energy processing facility will be consistent with this commercial energy related service station usage.

To the south and east of the site are primarily agricultural and agriculturally related land uses. The character of these uses is different from the proposed industrial usage.

To the west of the project site are various commercial and industrial uses. They are primarily related to light industrial and highway business use. The proposed industrial project would be consistent with these businesses.

#### 6.4.2 Zoning

The proposed site is currently zoned I-1, Light Industrial District. Refuse processing facilities are not expressly permitted in the district. It is, however, allowed as a conditional use (waste transfer and reduction facilities). An application for a conditional use has been filed with the Building Zoning Administration for review by the Planning Commission of Elk River. The Planning Commission may impose limitations on conditional uses as it deems fit.

The dimensions of the building site allow for compliance with the minimum lot and set back requirements stated in the zoning ordinance. The maximum height of the principal building is restricted to 40 feet unless otherwise approved by the Planning Commission.

The zoning ordinance also requires proper buffering of industrial uses. The site plan for the facility shows provision for plantings designed to screen the facility. It is not expected that harmful noise (see Section 6.6) or odors (Section 6.1) would be detectable beyond the site boundaries.

#### 6.5 Transportation

##### 6.5.1 Introduction

This section discusses traffic congestion and related issues that may be associated with the construction and operation of the proposed

project. Transportation impacts during construction are initially discussed and pertain to any of the proposed sized facilities. Operational impacts differ depending on the size of the proposed facility. As a result, a discussion of the 500, 1000, and 1500 tpd alternatives is provided separately.

#### 6.5.2 Traffic Conditions During Peak Construction

Construction traffic would be expected to average between 40 and 50 vehicles per day (NSP, 1986). Assuming that the 50 trucks (of approximately 50 feet in length) would arrive during the course of a 10-hour workday on a random basis, it is estimated that 5 delivery trucks would arrive and depart the site during both the AM and PM peak hour periods.

It is estimated that 60 construction employees would be arriving and departing the site on a daily basis during the three to six-month peak construction period. Of the 60 employees, 25 percent would be expected to arrive during the AM commuter peak hour and depart during the PM commuter peak hour. Assuming a vehicle occupancy rate of 1.0 persons per vehicle, 15 vehicles are likely to arrive during the AM peak hour and leave during the PM peak hour.

Expected arrival routes for the employees and truck construction traffic are estimated to be as follows:

- 10 employees and 5 trucks from the north via U.S. Route 10, and
- 5 employees from the south via U.S. Route 10.

Figures 6.5-1 through 6.5-3 show traffic volumes with construction of the facility.

Table 6.5-1 shows the level of service for the affected intersections in 1987 (assuming a 2.5 percent background growth in traffic) during the peak construction period. This peak period is expected to last for 3 to 6 months. The level of service would be unchanged from existing conditions at the intersection of U.S. Route 10 and Main Street. During the PM peak hour, the level of service at the

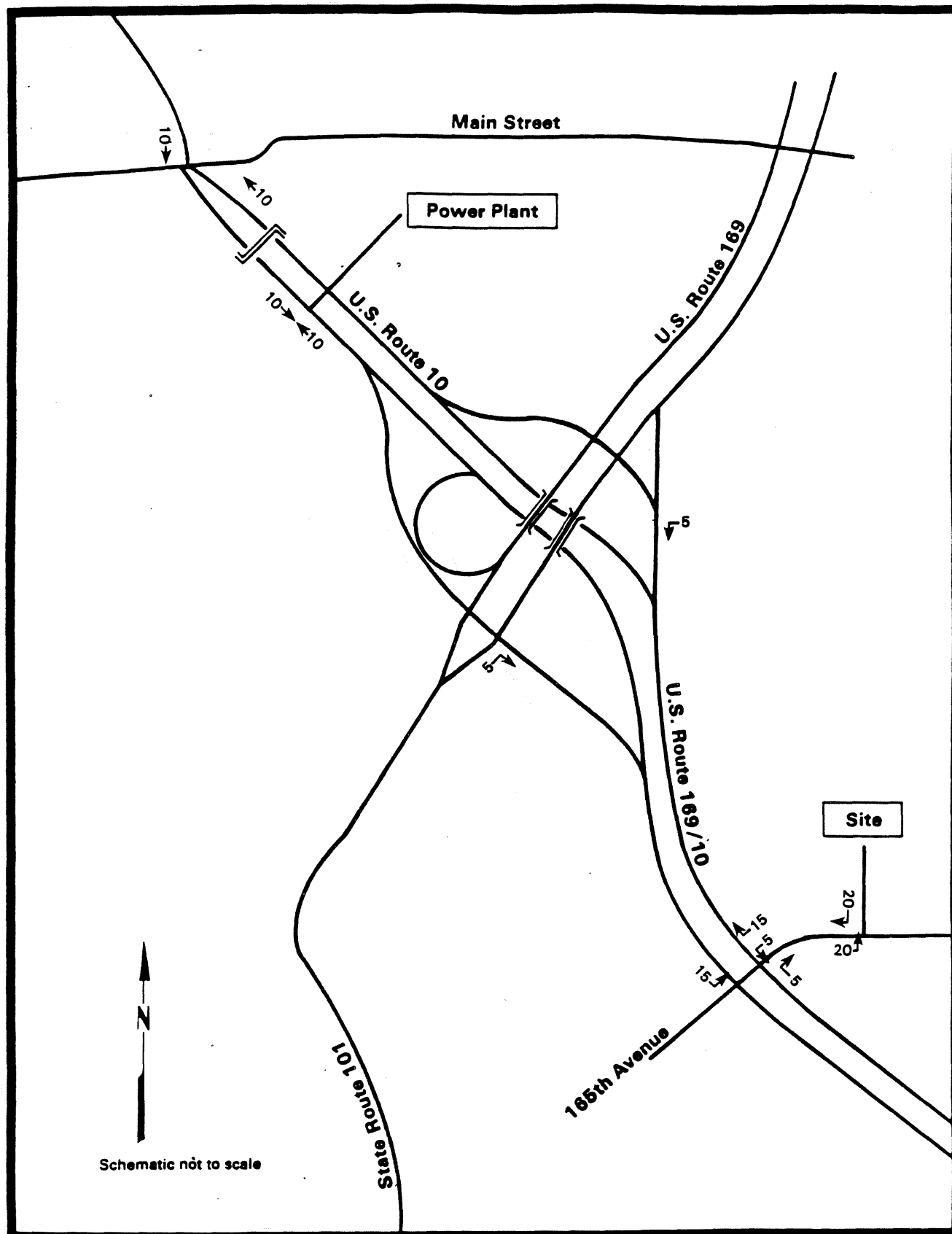


Figure 6.5-1 1987 Peak Construction Generated Traffic A.M. and P.M. Peak Hours



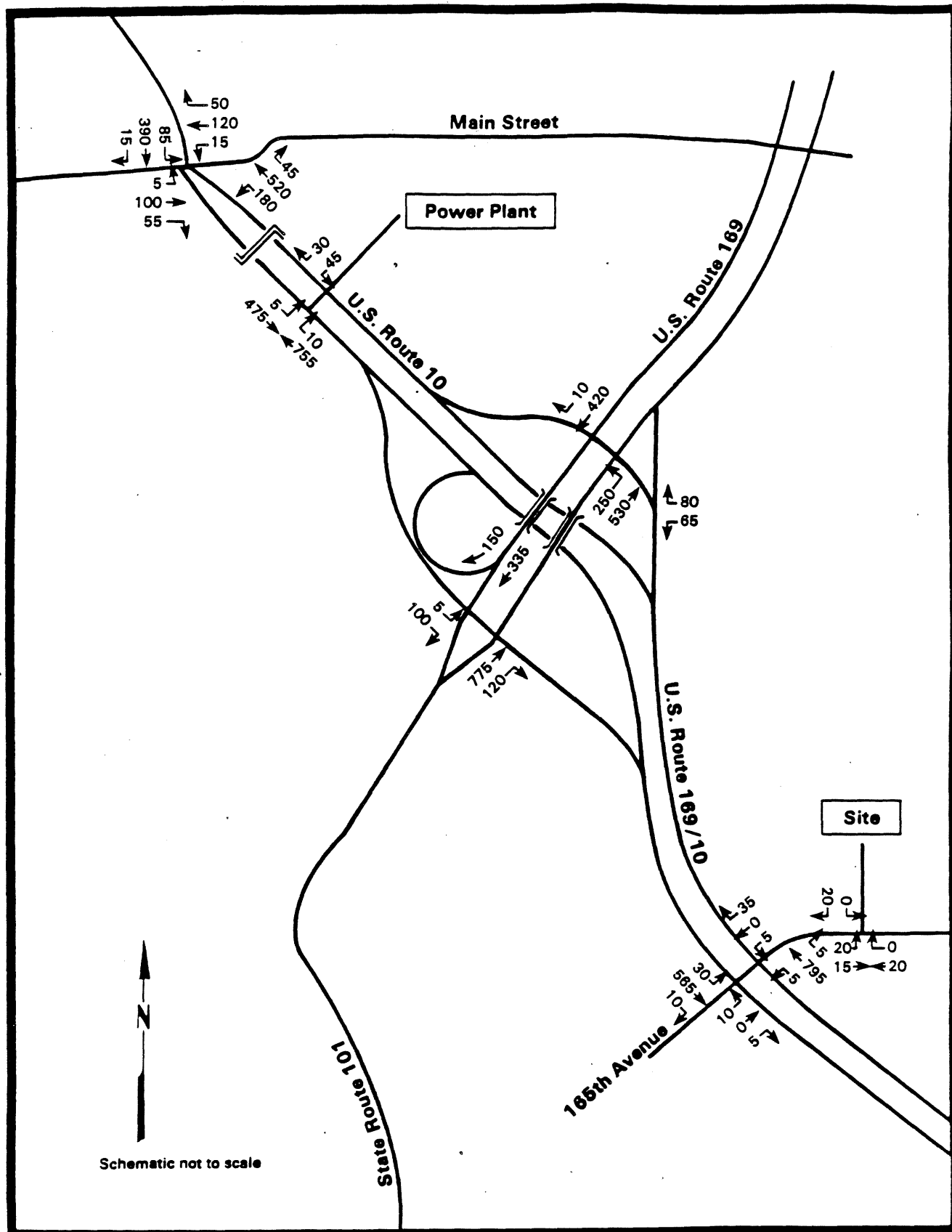


Figure 6.5-3 1987 Cumulative Traffic Volumes - P.M. Peak Hour

TABLE 6.5-1  
LEVELS OF SERVICE DURING 1987 PEAK  
CONSTRUCTION PERIOD

| <u>Intersection</u>                                             | <u>Level of Service</u> |             |
|-----------------------------------------------------------------|-------------------------|-------------|
|                                                                 | <u>Peak Hour</u>        |             |
|                                                                 | <u>A.M.</u>             | <u>P.M.</u> |
| U.S. Route 10 and Main Street                                   | A                       | B           |
| U.S. Route 10 and Power Plant<br>Access Road                    | A                       | C           |
| U.S. Route 10 and U.S. Route 169<br>and State Route 101 (North) | B                       | B           |
| U.S. Route 10 and U.S. Route 169<br>and State Route 101 (South) | A                       | B           |
| U.S. Route 169/10 and 165th Avenue                              | B                       | B/C         |
| Site Access Drive and 165th Avenue                              | A                       | A           |

Source: ERT, 1986.

Highway 10 and UPA power plant access road would decline to LOS C operations as shown in Table 6.5-1. Similarly, at the intersection of U.S. Route 10 southbound and U.S. 169 the level of service will decline to a B/C in the PM peak hour. In all cases the level of service would equal or exceed LOS C operations, the accepted design and operating standard for roadways (Highway Capacity Manual, 1985).

#### 6.5.3 1989 Baseline

In preparing an analysis of future year traffic conditions, historic traffic data should be analyzed to identify any apparent patterns of growth. Using available data from MNDOT, past traffic volumes were analyzed. A growth rate of 2.5 percent per year was arrived at through review of historic data. Figures 6.5-4 and 6.5-5 show expected traffic volumes in 1989 without the project.

Table 6.5-2 provides the expected level of service in 1989 without the proposed project. When compared to existing conditions, several changes can be observed. The intersection of U.S. Route 10 and the UPA power plant access road would operate at a LOS B/C condition in the PM, a slight decline from existing operations (LOS B). The intersection of U.S. Route 10 and U.S. Route 169 would be expected to operate at LOS B in the PM peak hour, a decline from existing LOS A operations. Similarly, expected operations at the intersection of U.S. Route 10 and 165th Street would be LOS B in the AM and PM, a decline from existing LOS A operations. All other intersection operations would remain unchanged. The generally desired design and operating standard for roadways is LOS C. All intersections analyzed would equal or exceed that standard.

#### 6.5.4 500 TPD Operations

In calculating the number of vehicles associated with operation of the RDF facility, four different sources of traffic were identified. They are:

- 1) Refuse delivery trucks;
- 2) Output transfer trucks (carrying RDF to UPA boilers),

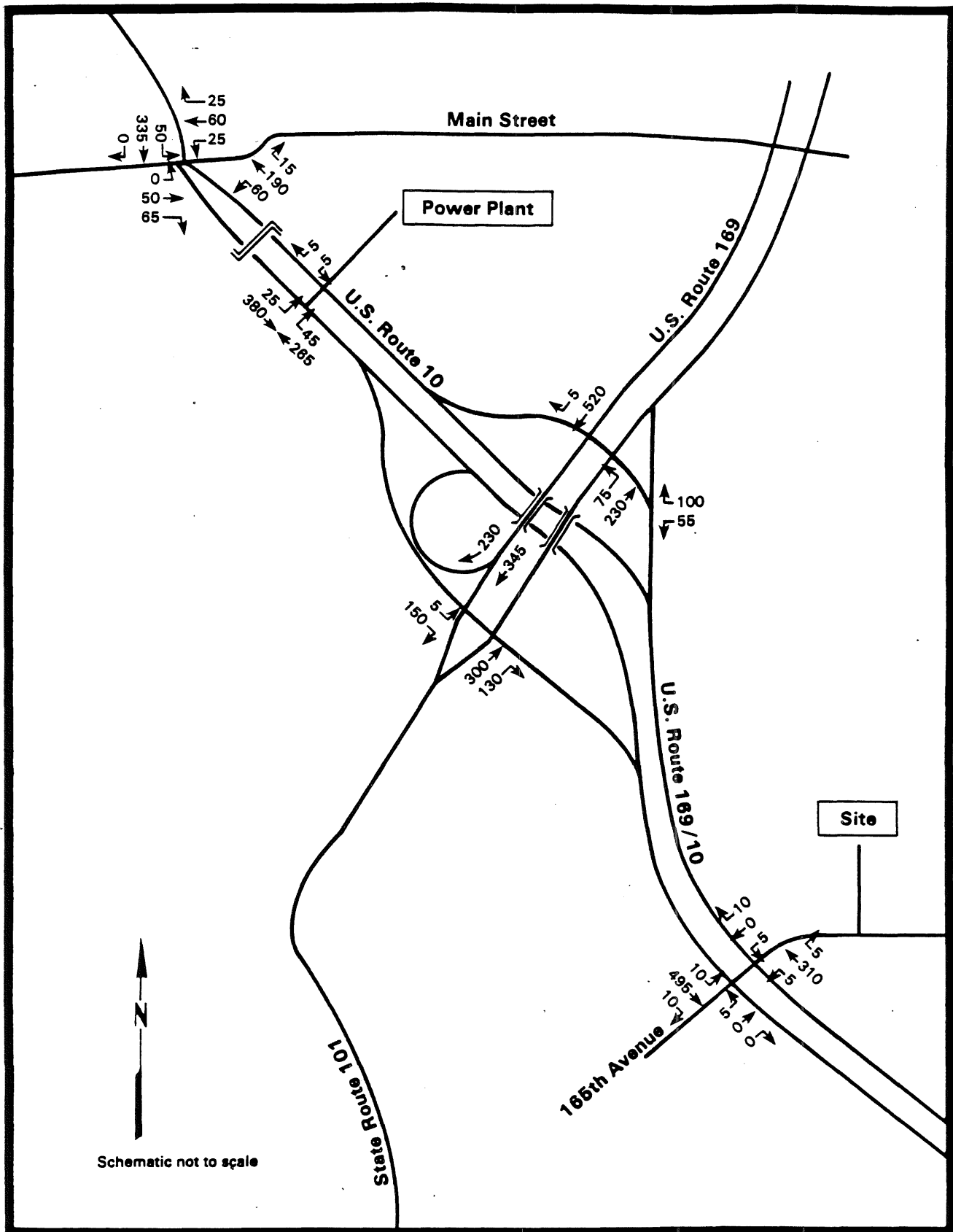


Figure 6.5-4 1989 Baseline Traffic Volumes - A.M. Peak Hour

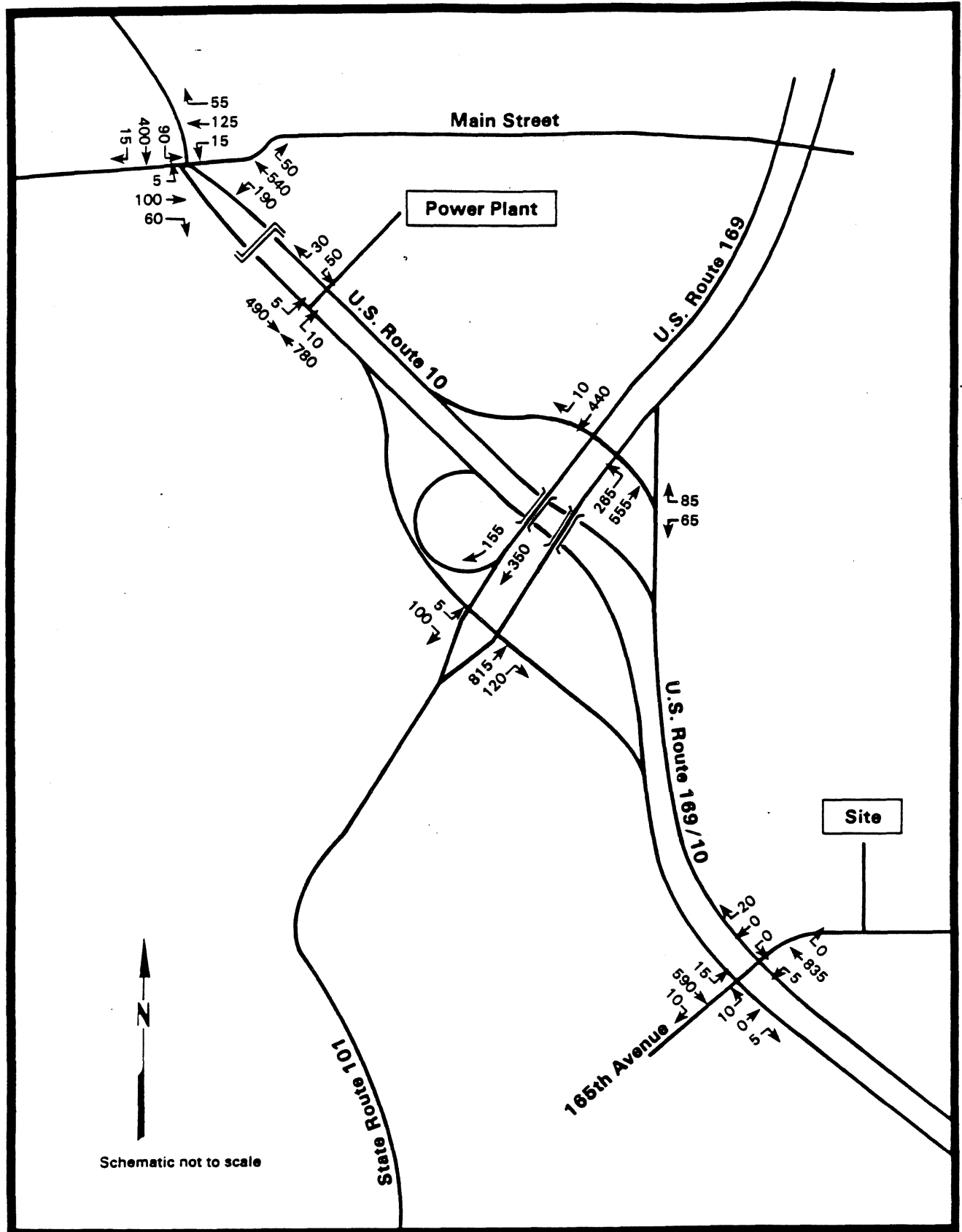


Figure 6.5-5 1989 Baseline Traffic Volumes - P.M. Peak Hour

TABLE 6.5-2  
1989 BASELINE LEVEL OF SERVICE

| <u>Intersection</u>                                             | <u>Level of Service</u> |             |
|-----------------------------------------------------------------|-------------------------|-------------|
|                                                                 | <u>Peak Hour</u>        |             |
|                                                                 | <u>A.M.</u>             | <u>P.M.</u> |
| U.S. Route 10 and Main Street                                   | A                       | B           |
| U.S. Route 10 and Power Plant<br>Access Road                    | A                       | B/C         |
| U.S. Route 10 and U.S. Route 169<br>and State Route 101 (North) | B                       | B           |
| U.S. Route 10 and U.S. Route 169<br>and State Route 101 (South) | A                       | B           |
| U.S. Route 169/10 and 165th Avenue                              | B                       | B           |

Source: ERT, 1986.

- 3) Employee vehicles, and
- 4) trucks delivering ash and residuals to landfill.

Refuse truck activity generated by the RDF facility during the AM and PM peak hours was calculated based upon the quantity of refuse to be processed. The facility would be a 500 tpd operation processing waste received primarily from Anoka County. Of that waste approximately 350 tons would be expected to be delivered by transfer trailer with the remaining 150 by packer truck. It was assumed that the transfer trucks would transport 20 tons per trailer and that the packer trucks would transport 5 tons of refuse each (Anoka County, 1986). Approximately 50 round trip deliveries to the site would be expected on a typical day. It is assumed that refuse delivery trucks would back-haul RDF residuals, rejects and combustion ash to landfill. In addition, approximately 20 round-trip RDF transfer truck deliveries would be made on a daily basis. Operation of the proposed facility would require the employment of approximately 40 individuals. Of that number approximately 30 would work the day shift with 5 employees working each of the remaining two maintenance shifts. It was assumed that employees would arrive and depart during the AM and PM peak hours. Some additional traffic would be generated due to use of the citizen drop-off facility.

Peak refuse truck traffic is not expected to coincide with the existing AM and PM commuter peak hours. It is assumed that ten percent of the total refuse truck traffic would arrive and depart during the AM and PM peak hours. Similarly, employee arrivals would occur during the peak commuter hour.

Directional distribution was assumed as follows:

- 100 percent of Anoka County refuse trucks would arrive from the south on U.S. Route 10.
- One-third of the employees would arrive from State Route 101 from the south and west.
- One-third of the employees would arrive from the north on U.S. Route 10, and
- One-third of the employees would arrive from the south or east on U.S. Route 10 or U.S. Route 169.

Figures 6.5-6 through 6.5-9 show the expected traffic volumes area roadways in 1989 with a 500 tpd facility.

Table 6.5-3 shows the resultant level of service at the intersections. For all intersections analyzed, operating conditions would equal or exceed the LOS C acceptable operating standard. The level of service would remain unchanged from 1989 Baseline operations (without the project) at the intersections of U.S. Route 10 and Main Street and U.S. Route 10 and U.S. Route 169. At U.S. Route 10 and the UPA power plant the level of service in the AM peak hour would decline to a LOS B operation. Similarly, a decline from 1989 baseline levels is expected at the intersection of U.S. Route 10 and 165th Street, to a B/C operation. Level of service A operations would be expected at the Site Access Drive and 165th Street.

#### 6.5.5 1000 TPD Operations

Refuse truck activity generated by the RDF facility during a typical day was estimated based upon historic data on waste generation for 10 counties. Table 6.5-4 provides an estimate of the likely waste contribution to the facility for each of the counties considered. The estimates in the table do not represent actual tons committed to the project. Rather they were developed for transportation purposes. As for the 500 tpd scenario, it was assumed that Anoka County would deliver 500 tpd to the facility. It is assumed that the remaining waste would be transported from the various counties via direct haul transfer trailers. Packer trucks may haul waste directly from areas in the immediate vicinity of the RDF facility.

Approximately 70 round-trip deliveries to the site are expected on a typical day. In addition, approximately 40 round-trip RDF transfer truck deliveries to the UPA plant would be made. Operation of the processing facility would require the employment of approximately 45 individuals. Of that number 35 would work the day shift.

The following assumptions on truck delivery and employee travel routes were made:

- Vehicles from Anoka County arrive from the south on U.S. Route 10.

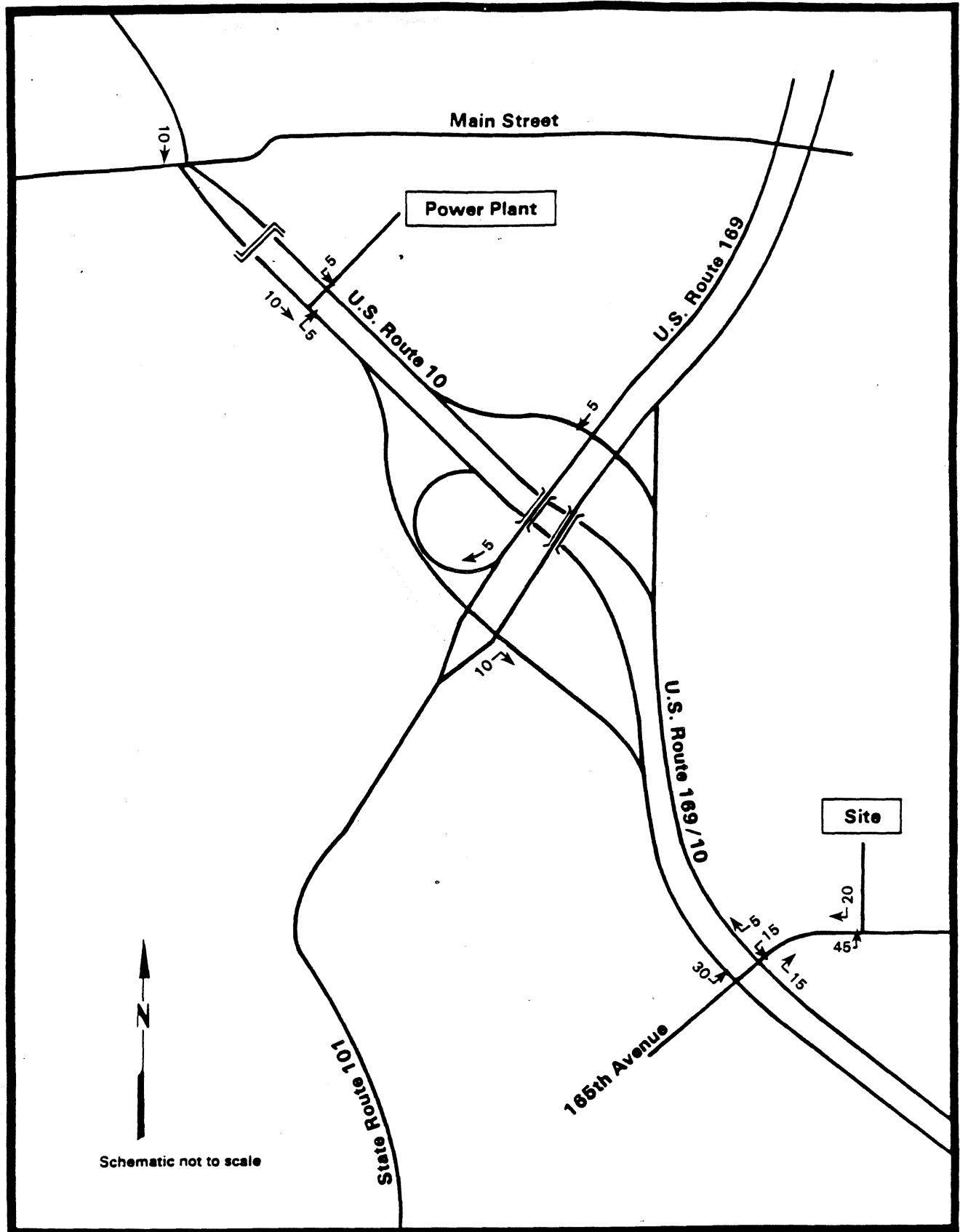


Figure 6.5-6 1989 Facility Generated Traffic for 500 TPD Facility - A.M. Peak Hour

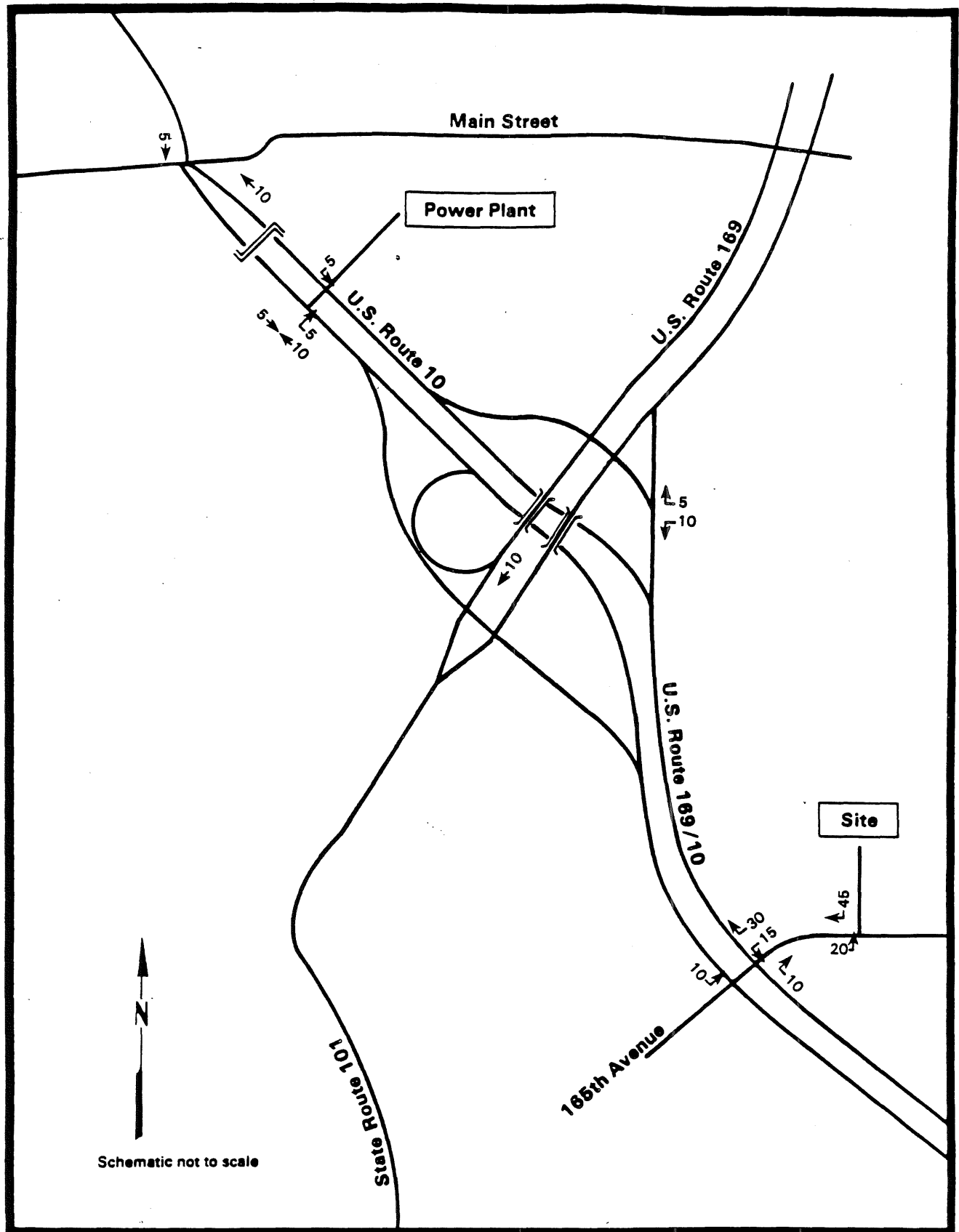


Figure 6.5-7 1989 Facility Generated Traffic for 500 TPD Facility - P.M. Peak Hour

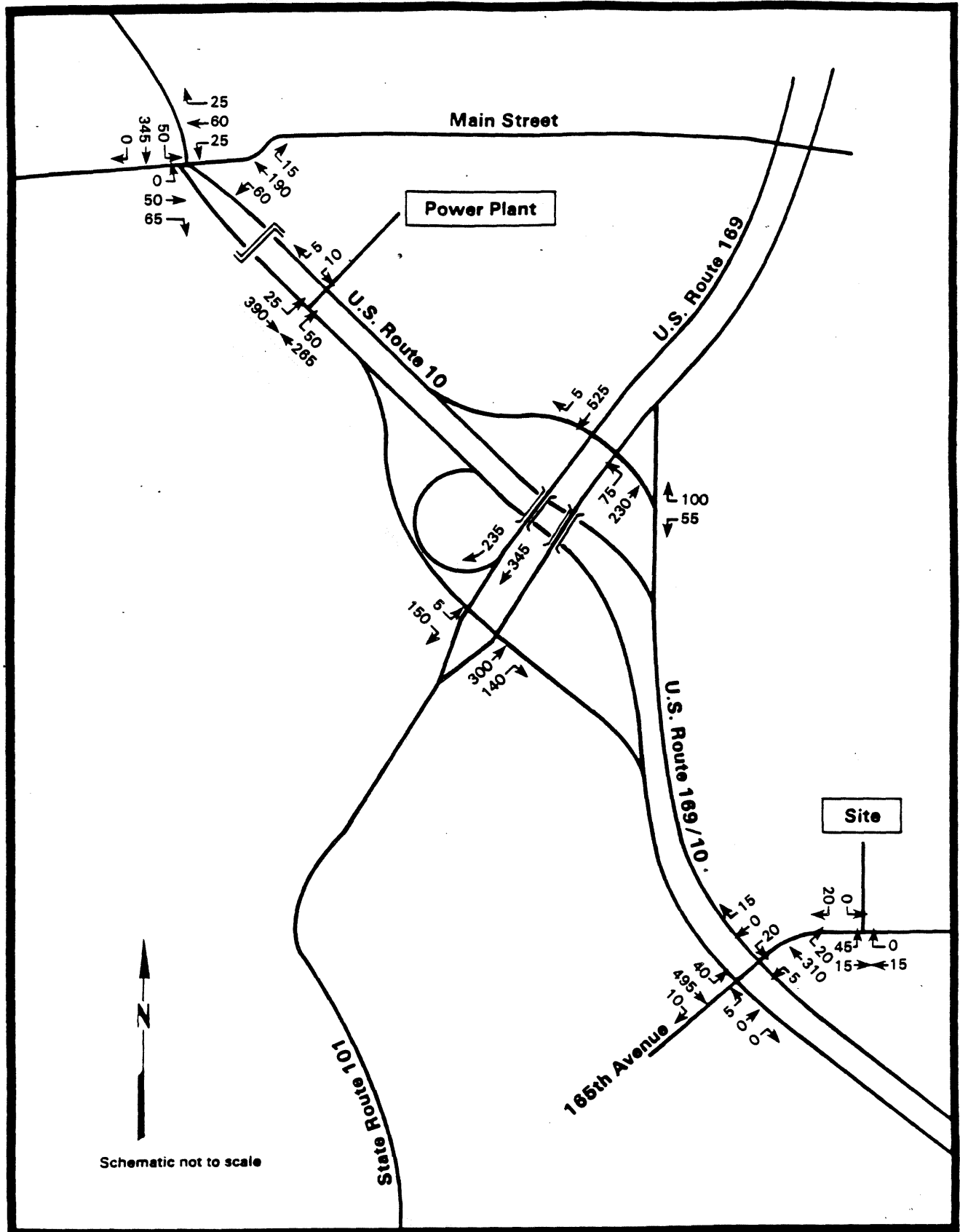


Figure 6.5-8 1989 Cumulative Traffic Volumes for 500 TPD Facility - A.M. Peak Hour

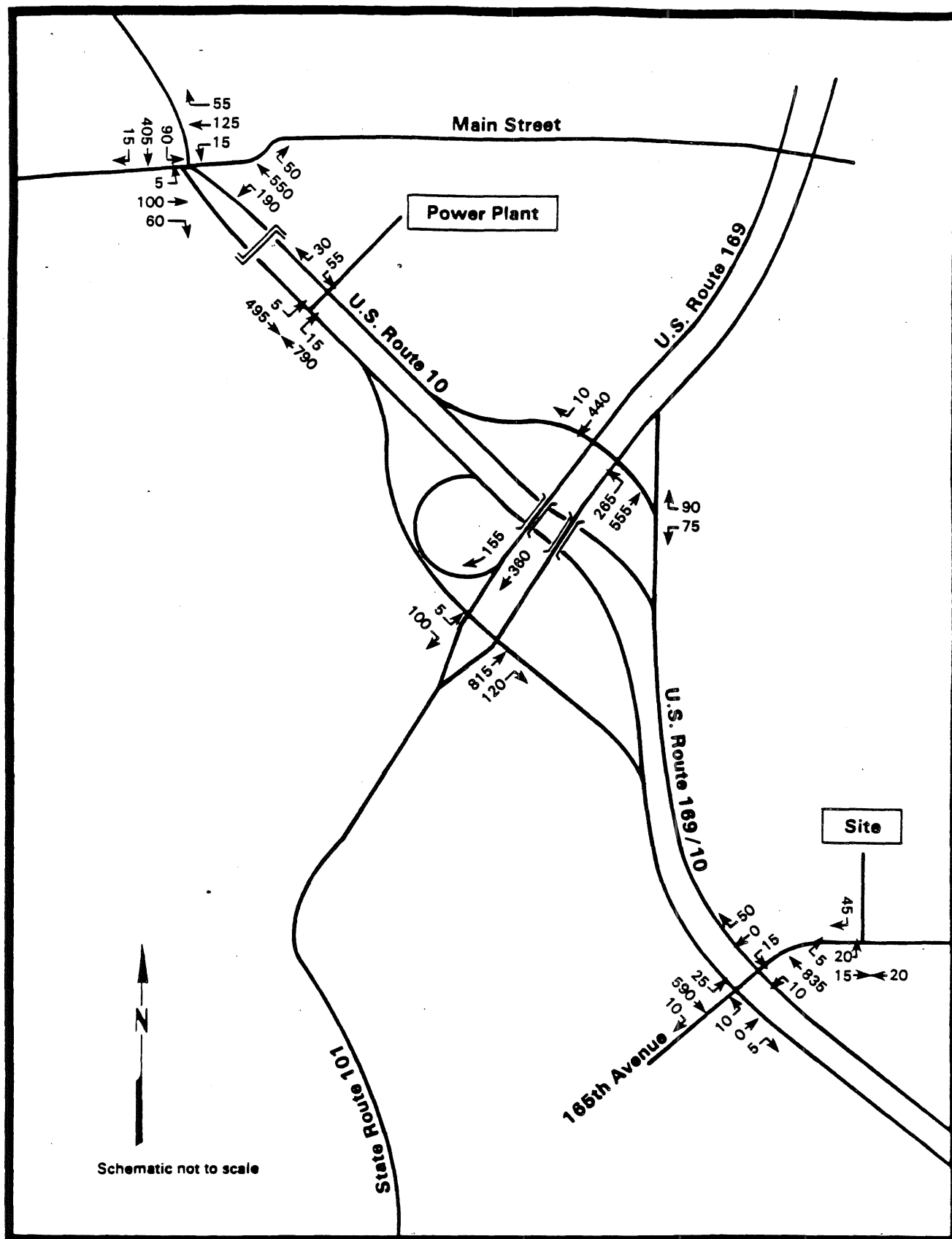


Figure 6.5-9 1989 Cumulative Traffic Volumes for 500 TPD Facility - P.M. Peak Hour

**TABLE 6.5-3**  
**LEVELS OF SERVICE FOR 500 TPD OPERATIONS**

| <u>Intersection</u>                                             | <u>Level of Service</u> |             |
|-----------------------------------------------------------------|-------------------------|-------------|
|                                                                 | <u>Peak Hour</u>        |             |
|                                                                 | <u>A.M.</u>             | <u>P.M.</u> |
| U.S. Route 10 and Main Street                                   | A                       | B           |
| U.S. Route 10 and Power Plant<br>Access Road                    | B                       | B/C         |
| U.S. Route 10 and U.S. Route 169<br>and State Route 101 (North) | B                       | B           |
| U.S. Route 10 and U.S. Route 169<br>and State Route 101 (South) | A                       | B           |
| U.S. Route 169/110 and 165th Avenue                             | B                       | B/C         |
| Site Access Drive and 165th Avenue                              | A                       | A           |

**Source: ERT, 1986.**

TABLE 6.5-4  
LEVELS OF SERVICE FOR 1,000 TPD  
OPERATIONS

| <u>Intersection</u>                                             | <u>Level of Service</u> |             |
|-----------------------------------------------------------------|-------------------------|-------------|
|                                                                 | <u>Peak Hour</u>        |             |
|                                                                 | <u>A.M.</u>             | <u>P.M.</u> |
| U.S. Route 10 and Main Street                                   | A                       | B           |
| U.S. Route 10 and Power Plant<br>Access Road                    | B                       | B/C         |
| U.S. route 10 and U.S. Route 169<br>and State Route 101 (North) | B                       | B           |
| U.S. Route 10 and U.S. Route 169<br>and State Route 101 (South) | A                       | B           |
| U.S. Route 169/10 and 165th Avenue                              | B                       | B/C         |
| Site Access Drive and 165th Avenue                              | A                       | A           |

Source: ERT, 1986.

- Vehicles from Mills Lacs, Isanti, Kanabec, and Pine counties would arrive from the north on U.S. Route 169.
- Vehicles from Chisago County would arrive from the south on U.S. Route 10.
- Vehicles from Benton, Sherburne, and Stearns would arrive from the north on U.S. Route 10.
- Vehicles from Wright County would arrive from the south on U.S. Route 10, and
- Employee distribution as described in Section 6.5.4 for 500 tpd facility.

Figures 6.5-10 through 6.5-13 show the expected traffic volumes on area roadways in 1989 with a 1000 tpd facility.

Table 6.5-5 shows the level of service calculations for key intersections. The level of service would remain unchanged at the intersections of U.S. Route 10 and Main Street and U.S. Route 10 and U.S. Route 169. At U.S. Route 10 and the UPA power plant the level of service in the AM peak hour would be expected to decline to LOS B, relative to 1989 baseline operations. Similarly, a decline from 1989 baseline conditions would result at the intersection of U.S. Route 10 and 165th Street, to a LOS B/C operation in the PM peak hour. Level of service A operations would occur at the Site Access Drive and 165th Avenue. For all intersections analyzed, operating conditions would equal or exceed the LOS C acceptable operating standard.

#### 6.5.6 1500 TPD Operations

Waste generation characterization for the 1500 tpd facility involved assumptions similar to the 1000 tpd facility. For the 1500 tpd facility it was assumed that all truck deliveries would be made between the hours of 7 A.M. and approximately 5 P.M. This results in worst case transportation impacts. For the two line (1600 tpd maximum) facility a similar assumption would result in transportation impacts the same as described in this section. Waste was estimated to be delivered from 11 counties, including 500 tpd from Hennepin County and

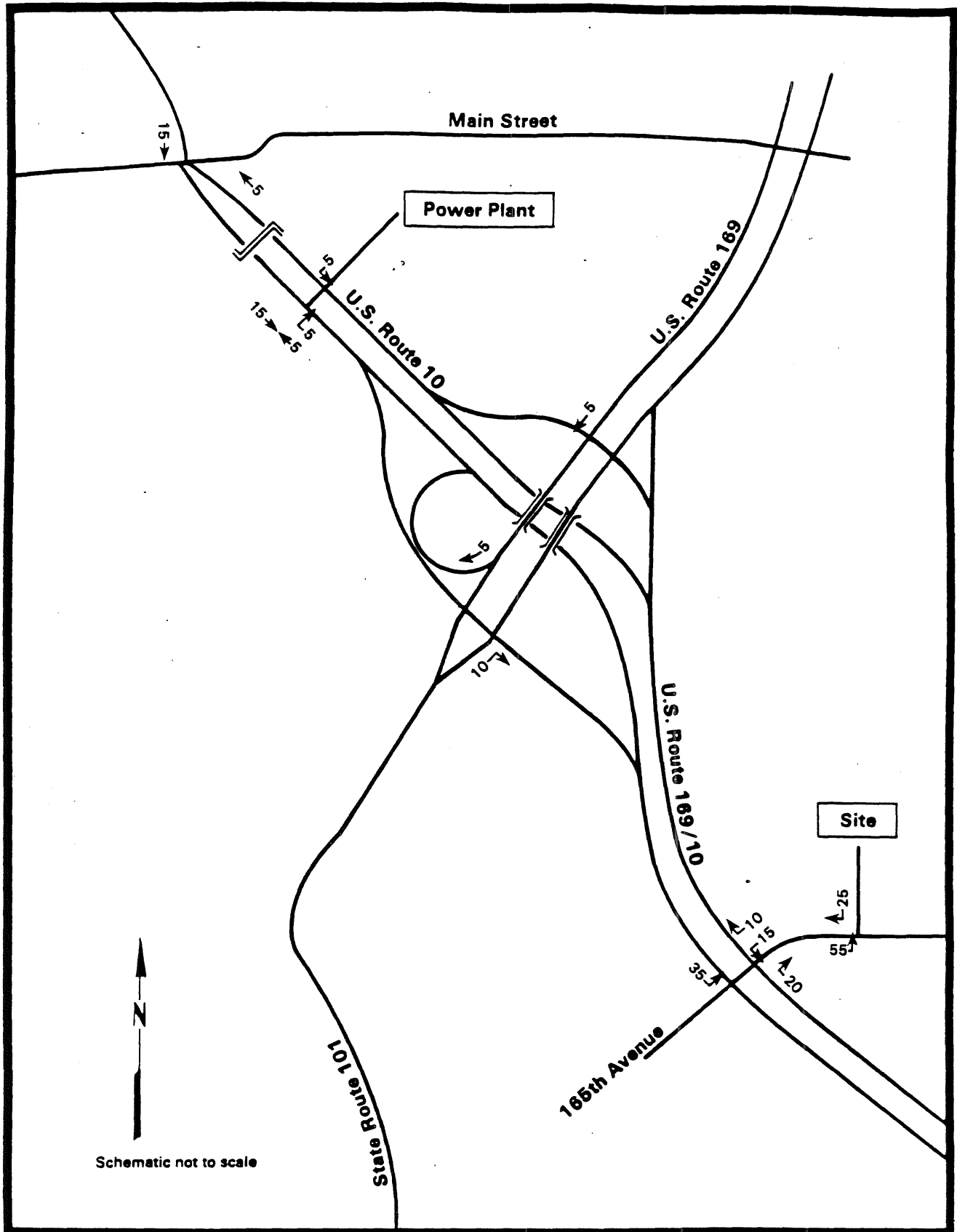


Figure 6.5-10 1989 Facility Generated Traffic for 1,000 TPD Facility - A.M. Peak Hour

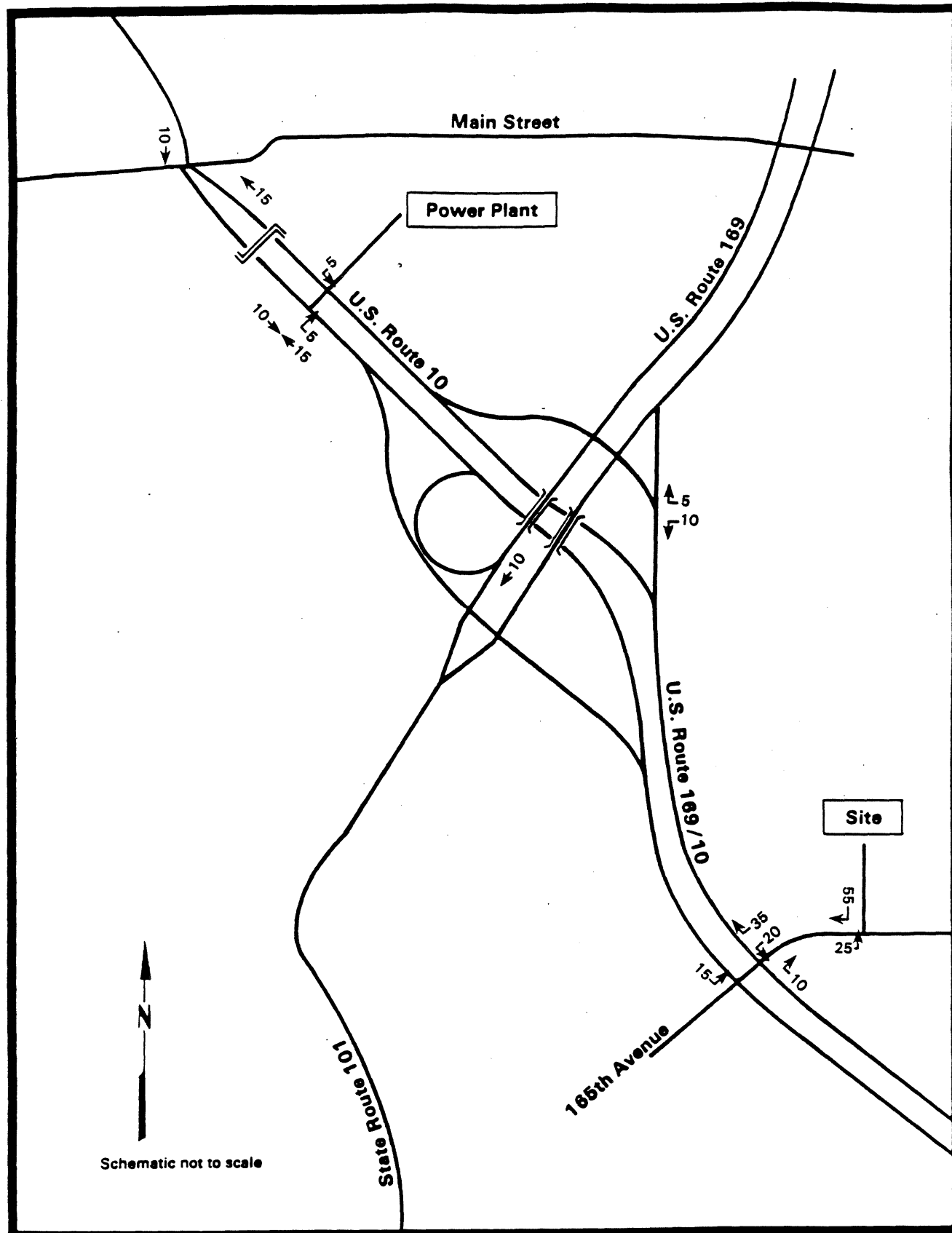


Figure 6.5-11 1989 Facility Generated Traffic for 1,000 TPD Facility - P.M. Peak Hour

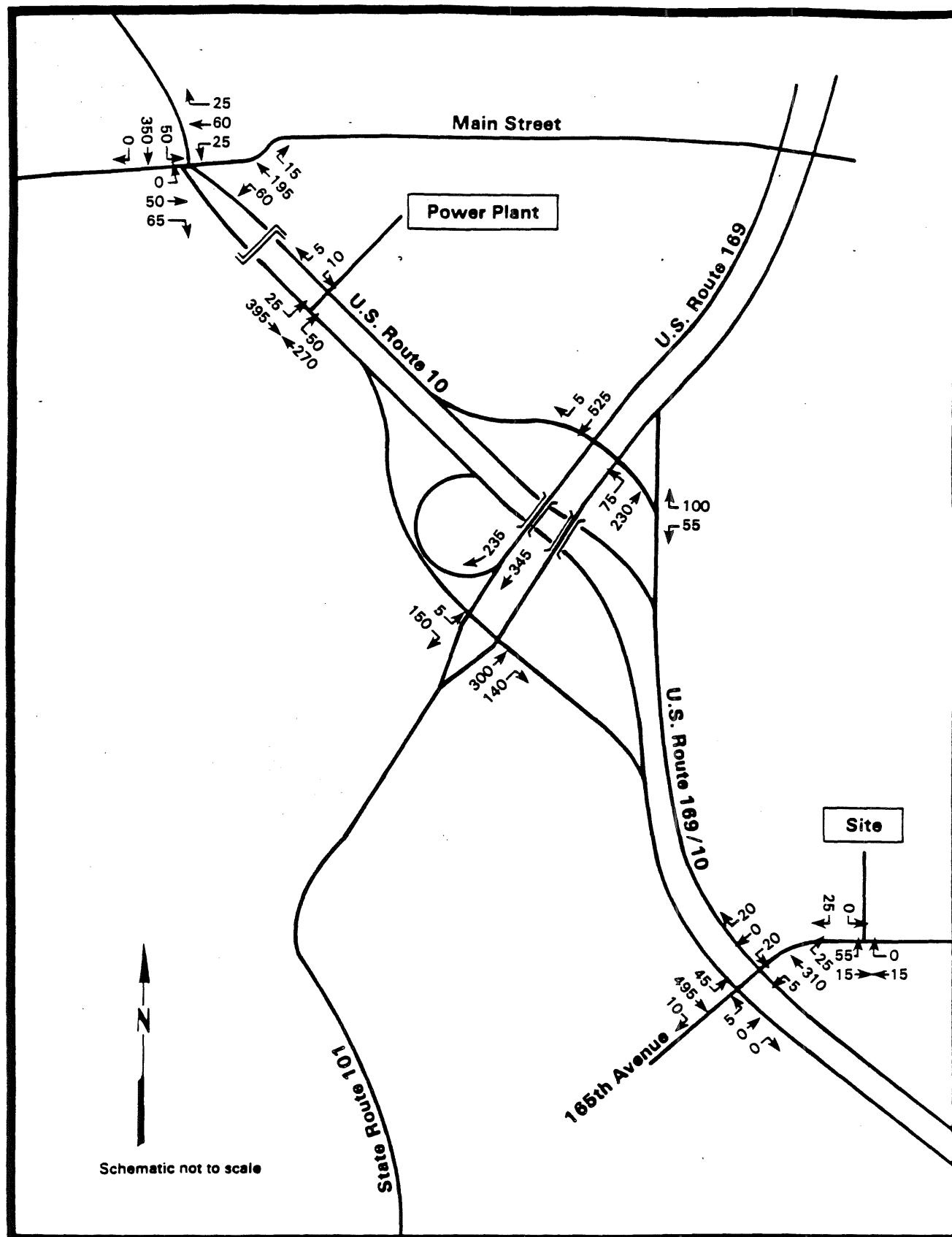


Figure 6.5-12 1989 Cumulative Traffic Volumes for 1,000 TPD Facility - A.M. Peak Hour

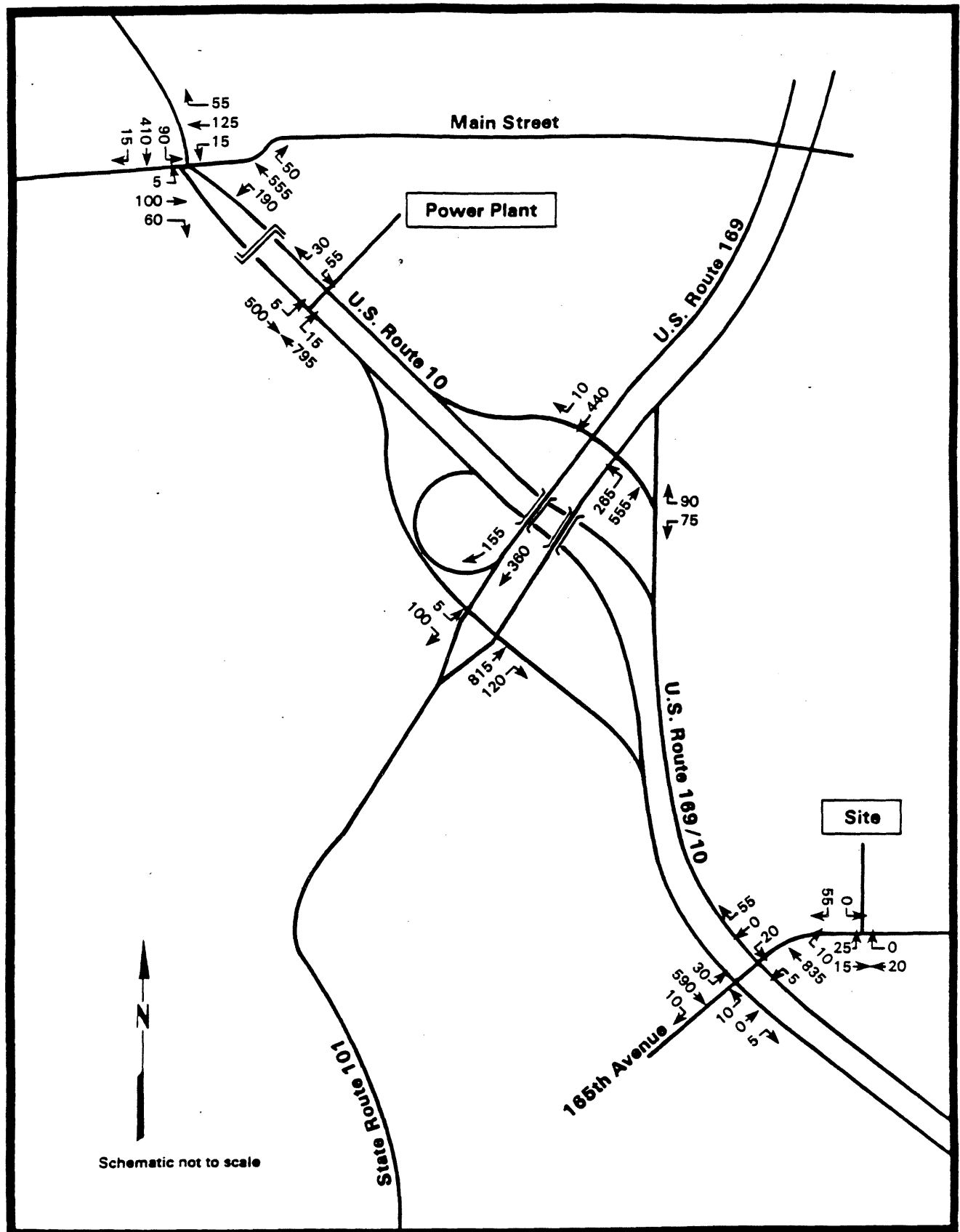


Figure 6.5-13 1989 Cumulative Traffic Volumes for 1,000 TPD Facility - P.M. Peak Hour

TABLE 6.5-5  
LEVELS OF SERVICE FOR 1500 TPD  
OPERATIONS

| <u>Intersection</u>                                             | <u>Level of Service</u> |             |
|-----------------------------------------------------------------|-------------------------|-------------|
|                                                                 | <u>Peak Hour</u>        |             |
|                                                                 | <u>A.M.</u>             | <u>P.M.</u> |
| U.S. Route 1'0 and Main Street                                  | A                       | B           |
| U.S. Route 10 and Power Plant<br>Access Road                    | B                       | B/C         |
| U.S. Route 10 and U.S. Route 169<br>and State route 101 (North) | B                       | B           |
| U.S. Route 10 and U.S. Route 169<br>and State Route 101 (South) | A                       | B           |
| U.S. Route 169/10 and 165th Avenue                              | B                       | B/C         |
| Site Access Drive and 165th Avenue                              | A                       | A           |

Source: ERT, 1986.

500 tpd from Anoka County. It is assumed that the remaining 500 tpd would be transported from the remaining 9 counties via transfer trailers.

Approximately 100 round trip refuse truck deliveries to the site and to landfills to dispose of RDF residuals would be expected on a typical day. In addition, approximately 50 round trip RDF transfer truck deliveries to the UPA plant would be made. Operation of the processing facility would require employment of about 50 individuals. Of that number, 40 will work the day shift.

The following assumptions on truck delivery and employee routings were made:

- Vehicles from Hennepin county arrive from the south on U.S. Route 101.
- Vehicles from Anoka County arrive from the south on U.S. Route 10.
- Vehicles from Mille Kacs, Isanti, Kanabec, and Pine Counties would arrive from the north on U.S. Route 169.
- Vehicles from Chisago County would arrive from the south on U.S. Route 10.
- Vehicles from Benton, Sherburne, and Stearns would arrive from the north on U.S. Route 10.
- Vehicles from Wright County would arrive from the south on U.S. Route 101, and
- Employee distribution as described in Section 6.5.4 for the 500 tpd facility.

Figures 6.5-14 through 6.5-17 show the expected traffic volumes on area roadways in 1989 with a 1500 tpd facility.

Table 6.5-6 depicts the Level of Service for key intersections. Level of service would remain unchanged from 1989 baseline conditions at the intersections of U.S. Route 10 and Main Street and U.S. Route 10 and U.S. Route 163. At U.S. Route 10 and the UPA power plant, the level of service in the AM peak hour would be expected to decline to LOS B. Similarly, a decline from 1989 baseline conditions would occur at the intersection of U.S. Route 10 and 165th Street in the PM peak



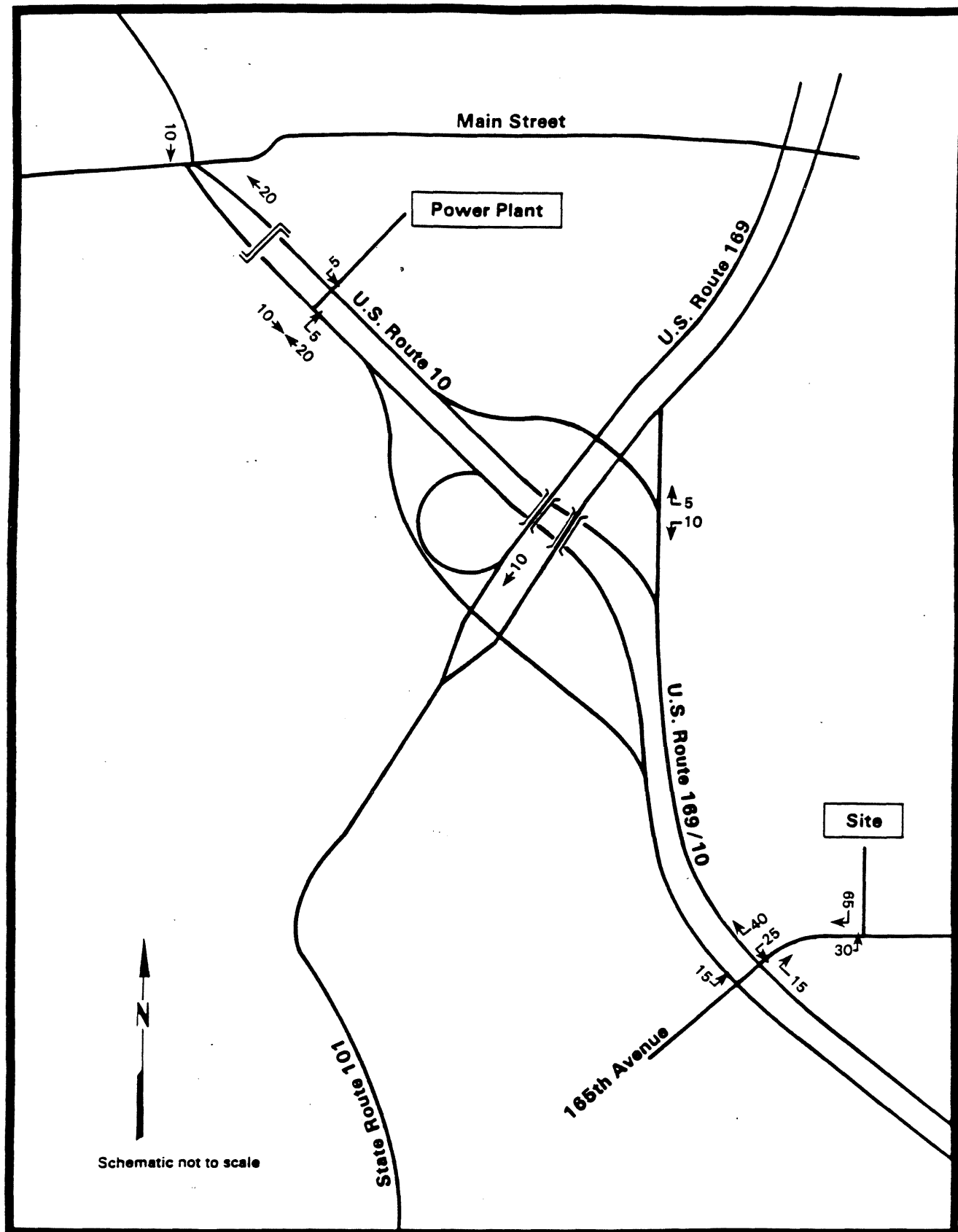


Figure 6.5-15 1989 Facility Generated Traffic for 1,500 TPD Facility - P.M. Peak Hour



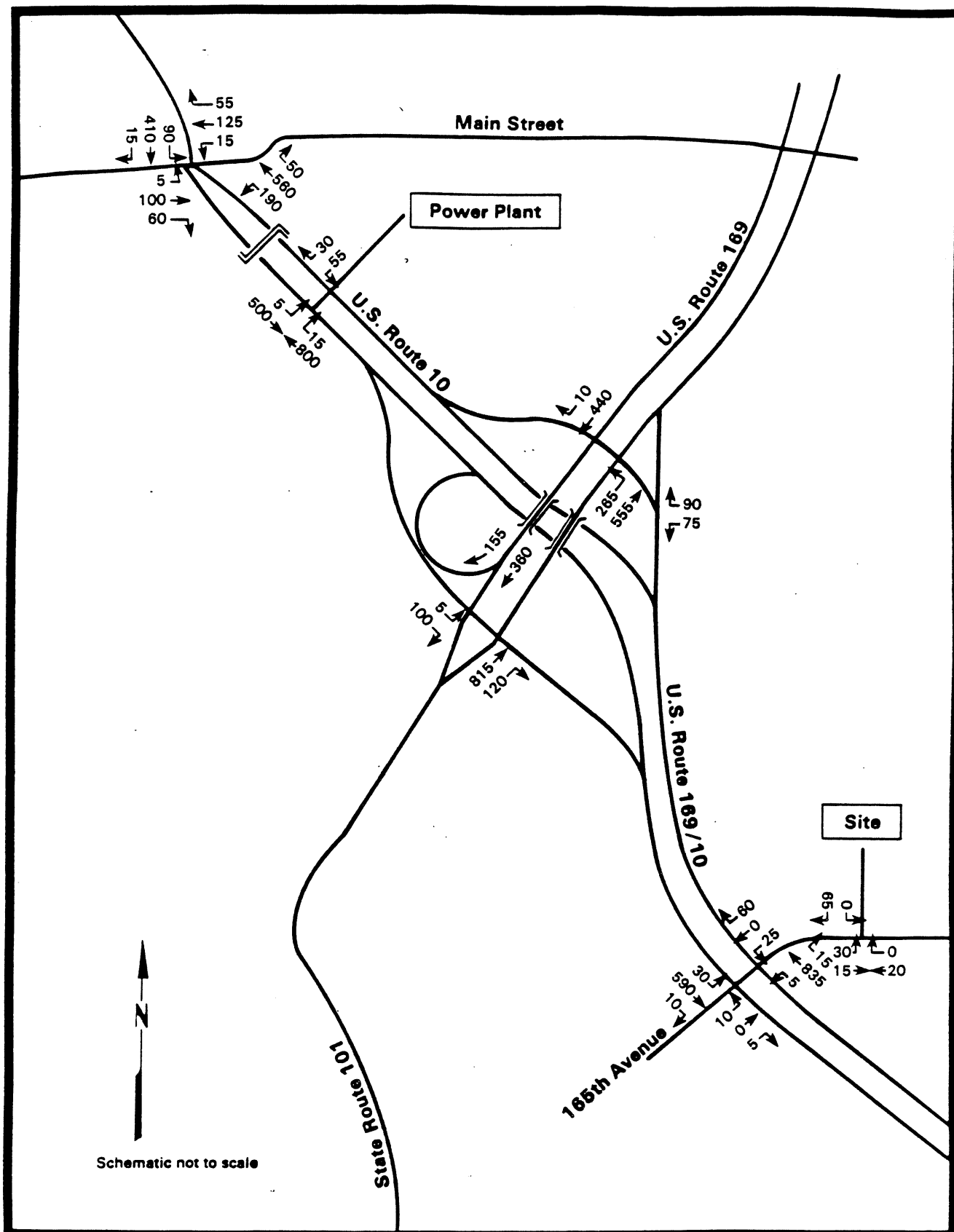


Figure 6.5-17 1989 Cumulative Traffic Volumes for 1,500 TPD Facility - P.M. Peak Hour

TABLE 6.5-6  
DAILY WASTE FLOW TO FACILITY

| <u>County</u> | <u>500 TPD Facility</u> |               | <u>1000 TPD Facility</u> |               | <u>1500 TPD Facility</u> |               |
|---------------|-------------------------|---------------|--------------------------|---------------|--------------------------|---------------|
|               | <u>Tons</u>             | <u>Trucks</u> | <u>Tons</u>              | <u>Trucks</u> | <u>Tons</u>              | <u>Trucks</u> |
| Chisago       | --                      | --            | 40                       | 2             | 40                       | 2             |
| Isanti        | --                      | --            | 25                       | 1             | 25                       | 1             |
| Kanabec       | --                      | --            | 20                       | 1             | 20                       | 1             |
| Mille Lacs    | --                      | --            | 20                       | 1             | 20                       | 1             |
| Pine          | --                      | --            | 20                       | 1             | 20                       | 1             |
| Benton        | --                      | --            | 50                       | 3             | 50                       | 3             |
| Sherburne     | --                      | --            | 70                       | 4             | 70                       | 4             |
| Stearns       | --                      | --            | 215                      | 10            | 215                      | 10            |
| Wright        | --                      | --            | 40                       | 2             | 40                       | 2             |
| Hennepin      | --                      | --            | --                       | --            | 500                      | 25            |
| Anoka         | <u>500</u>              | <u>50</u>     | <u>500</u>               | <u>50</u>     | <u>500</u>               | <u>50</u>     |
| TOTAL         | 500                     | 50            | 1000                     | 75            | 1500                     | 100           |

- NOTES: 1. Numbers above are estimates for use in transportation analysis. They do not represent tons committed by particular counties.
2. -- = Although waste would be generated within a county, it might not be delivered to the RDF facility.
3. It was assumed that Hennepin County would contribute 500 tpd to a 1500 tpd facility. It is possible that Hennepin County would supply waste under a 500 or 1,000 tpd scenario if other counties would not commit such waste.

hour. Level of service A operations are expected at the Site Access Drive and 165th Street. For all intersections analyzed, operating conditions are expected to equal or exceed the LOS C operating standard.

Table 6.5-4 provides detailed information on daily waste and truck generation for each of the alternatives analyzed (Anoka County, 1986, ERT, 1986). The numbers represent estimated waste generation by each County. They do not indicate waste amount committed to the proposed project.

#### 6.5.7 Safety Concerns

As described in Section 5.5.4 (Baseline Safety Concerns), no sight deficiencies were recorded by ERT field personnel. Sight distance were in excess of 500 feet, and were above recommended standards. It can be concluded that adequate sight distances would exist at the key intersections.

#### Traffic Demand Volumes

Safe operation of an intersection is also a function of the demand through that intersection. In order to provide adequate operating conditions, traffic signals, if warranted, should be placed at an intersection. If demand volumes are not satisfactorily high, a traffic signal should not be recommended. The Federal Highway Administration in January of 1985 placed several new traffic signal warrants into effect by updating the manual on Uniform Traffic Control Devices. (ITE Journal December 1985). A peak hour volume warrant specifies that the volumes on the minor street approach must exceed 100 vehicles per hour at an intersection of a two or more lane road and a one lane roadway, such as the intersection of U.S. Route 10 and 165th Street.

The one way approach volumes on 165th Street (the minor road) with a 1500 tpd facility would be 85 vehicles in the PM peak hour, less than the 100 vehicles required to satisfy the warrant. For the 1000 tpd and 500 tpd facility, traffic volumes on 165th Street would be less. These traffic volumes do not meet the criteria for traffic signalization. Similarly, the criterion for traffic signalization is not met at the

intersection of the UPA power plant and U.S. Route 10, traffic volumes on the UPA access road would be less than 100 vehicles per hour regardless of project size.

### Truck Traffic

Trucks require longer stopping distances from a given speed than do passenger vehicles. However, there is a factor that balances the additional braking distance for trucks. The truck operator is able to see vertical features of an obstruction farther away than a driver of an automobile because of the higher position of the seat in the vehicle. As a result, the stopping and sight distances for a truck are effectively equal to that of an automobile. Recognizing this, the American Association of State Highway and Transportation Officials acknowledges that "separate stopping sight distances for trucks and passenger cars, therefore are not used in highway design standards." ("A Policy on Geometric Design of Highways and Streets, 1984", American Association of State Highway and Transportation Officials, Washington, D.C. p. 135-145. AASHTO, D.C.).

## 6.6 Noise Impacts

A number of sound and therefore noise characteristics can be measured. Sound pressure is the most basic and common measure. A reading of zero decibels corresponds to the minimum threshold of human hearing in healthy individuals. It takes an increase of about two to three decibels before the average person perceives any noticeable increase in loudness, and an increase of 10 decibels before a person perceives a sound to be twice as loud.

### 6.6.1 Impact Criteria

Noise impact can be evaluated based on whether (a) specific governmental laws or regulations are exceeded and (b) whether it appears that sensitive receptors will be adversely affected.

No federal regulations directly apply to community noise resulting from the proposed project. The MPCA has, however, promulgated noise standards which were discussed previously in Section 5.6.

Table 6.6-1 provides the relevant MPCA standards for each of the receptors analyzed. Both daytime and nighttime standards are shown.

#### 6.6.2 Noise Levels Associated with RDF Facility and UPA Operation

The major source of outdoor noise from the RDF processing facility will be draft fans, baghouse, front-end loader, mechanical equipment, and truck deliveries of refuse during daylight hours. Noise sources at the UPA facility will be truck deliveries and mechanical equipment. There are three separate operating scenarios analyzed in this section. These include a 500 tpd RDF processing facility, a 1000 tpd RDF facility, and a 1500 tpd RDF facility.

##### 500 TPD Processing Facility

The 500 tpd RDF processing facility would consist of one processing line capable of accommodating 50 tons per hour. The facility would generally operate on a ten-hour shift from 7 AM to 5 PM. After 5 PM a small maintenance crew would be located on-site for clean-up and maintenance purposes. In general, refuse would not be processed after 5 PM, and therefore noise from the facility in the evening would be minimal. During the daylight operating shift there would be several sources of noise. Refuse vehicle deliveries would contribute to project noise. Truck deliveries will peak in the mid-morning and early to mid-afternoon. Only omitted deliveries are expected in the late afternoon (from 3 PM - 6 PM). RDF transfer trailers would also deliver waste from the processing plant to the UPA power plant during daylight hours. Approximately 350 tons per day would be delivered to the power plant per day resulting in about 230 round trips. At the processing plant during daylight hours noise would be generated due to the processing of the refuse. Noise sources would include: operation of fans and associated baghouse equipment, operation of a front-end loader, and operation of processing equipment.

TABLE 6.6-1  
NOISE STANDARDS

| <u>Receptors</u> | $L_{50}$ |          | $L_{10}$ |          | $L_{eq}$ |          |
|------------------|----------|----------|----------|----------|----------|----------|
|                  | <u>D</u> | <u>N</u> | <u>D</u> | <u>N</u> | <u>D</u> | <u>N</u> |
| Receptor 1       | 60       | 50       | 65       | 55       | 63       | 53       |
| Receptor 2       | 60       | 50       | 65       | 55       | 63       | 53       |
| Receptor 3       | 65       | 65       | 70       | 70       | 68       | 68       |
| Receptor 4       | 60       | 50       | 65       | 55       | 63       | 53       |

---

NOTE: 1) D = Day (7 AM - 10 PM)  
 2) N = Night (10 PM - 7 AM)  
 3)  $L_{eq}$  standard is proposed only.

Source: MPCA.

A noise impact assessment was undertaken to determine the noise levels associated with the operation of the RDF processing plant as well as the UPA power plant. It should be noted that the RDF plant would operate during daylight hours. Nighttime noise would therefore be minimal. The UPA power plant would operate on a 24-hour basis, but would generally receive truck deliveries only during daylight hours. In order to model the noise from operations at the UPA power plant and the RDF facility, actual monitoring data for similar facilities was utilized. Noise monitoring data was available for a 1000 tpd RDF processing facility operated by National Ecology in Baltimore, Maryland. The proposed facility is modeled after this Baltimore facility. National Ecology is a consultant to NSP regarding development of RDF facilities. As a result the proposed facility would be essentially the same as the Baltimore facility. The monitoring data collected for the Baltimore facility is shown in Table 6.6-2. Similarly, noise monitoring data was collected for an existing refuse burning plant in Pittsfield, Massachusetts operated by Viccon. This plant burns approximately 320 tons per day of refuse similar to the proposed UPA operations. Table 6.6-3 provides the noise monitoring data for this facility.

The actual monitoring data for the Baltimore, Maryland and Pittsfield, MA facilities were modeled to determine expected noise levels from the proposed facilities. Noise levels were adjusted for facility size and the distance of the receptors from the proposed facilities. The FHWA noise model for truck traffic passbys was employed to model truck traffic during the daylight hours when refuse deliveries would occur.

#### 500 TPD Processing Facility Impacts

Table 6.6-4 provides the results of the noise modeling for the Proposed 500 tpd facility. It should be noted that the RDF processing plant would not operate during the evening (under the 500 tpd scenario), thus it was assumed that there would not be significant noise from the facility in the evening. The table shows that future noise levels at receptor one would be expected to 49, 52, and 54 dBA

TABLE 6.6-2  
MONITORED NOISE LEVELS FOR BALTIMORE, MARYLAND RDF  
PROCESSING PLANT

| <u>Noise Statistic</u> | <u>Monitored Noise Levels</u> |     |
|------------------------|-------------------------------|-----|
| $L_{90}$               | 66                            | dBA |
| $L_{50}$               | 68                            | dBA |
| $L_{10}$               | 70                            | dBA |
| $L_{eq}$               | 71                            | dBA |

- 
- NOTES: 1) Baltimore facility operated by National Ecology, Consultants to NSP. Facility represents model for design of proposed facility.
- 2) Baltimore facility processes about 1000 tpd of refuse.
- 3) Monitoring was taken on 2/20/85 at approximately 11 AM 100 feet from receiving doors.
- 4) Facility was fully operational.

Source: ERT, 1985.

TABLE 6.6-3  
MONITORING DATA FOR VICON REFUSE  
BURNING FACILITY

| <u>Noise Statistic</u> | <u>Monitored Noise Levels</u> |
|------------------------|-------------------------------|
| L <sub>90</sub>        | 57 dBA                        |
| L <sub>50</sub>        | 60 dBA                        |
| L <sub>10</sub>        | 66 dBA                        |
| L <sub>eq</sub>        | 65 dBA                        |

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NOTE: 1) Monitoring taken for 320 TPD  
refuse burning facility.

2) Monitoring location 100 feet from plant.

Source: ERT, 1985.

TABLE 6.6-4

## EXPECTED FUTURE NOISE LEVELS - 500 TPD FACILITY

| Location   | Baseline        |                 |                 |                 | Project Only    |                 |                 |                 | Future Noise Levels<br>With Project |                 |                 |                 | Increase Due<br>to Project |                 |                 |                 |
|------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-------------------------------------|-----------------|-----------------|-----------------|----------------------------|-----------------|-----------------|-----------------|
|            | L <sub>90</sub> | L <sub>50</sub> | L <sub>10</sub> | L <sub>eq</sub> | L <sub>90</sub> | L <sub>50</sub> | L <sub>10</sub> | L <sub>eq</sub> | L <sub>90</sub>                     | L <sub>50</sub> | L <sub>10</sub> | L <sub>eq</sub> | L <sub>90</sub>            | L <sub>50</sub> | L <sub>10</sub> | L <sub>eq</sub> |
| 1. Min (N) | 39              | 42              | 46              | 46              | --              | --              | --              | --              | 39                                  | 42              | 46              | 46              | 0                          | 0               | 0               | 0               |
| Max (D)    | 39              | 42              | 46              | 51              | 46              | 48              | 50              | 51              | 47                                  | 49              | 52              | 54              | 8                          | 7               | 6               | 3               |
| 2. Min (N) | 39              | 48              | 56              | 53              | --              | --              | --              | --              | 39                                  | 48              | 56              | 53              | 0                          | 0               | 0               | 0               |
| Max (D)    | 58              | 64              | 76              | 72              | 38              | 40              | 42              | 43              | 58                                  | 64              | 76              | 72              | 0                          | 0               | 0               | 0               |
| 3. Min (N) | 34              | 42              | 54              | 52              | 33              | 36              | 42              | 41              | 37                                  | 43              | 54              | 52              | 3                          | 1               | 0               | 0               |
| Max (D)    | 45              | 54              | 63              | 62              | 46              | 48              | 50              | 51              | 49                                  | 55              | 63              | 62              | 4                          | 1               | 0               | 0               |
| 4. Min (N) | 34              | 37              | 41              | 42              | 29              | 32              | 38              | 37              | 35                                  | 38              | 43              | 43              | 1                          | 1               | 2               | 1               |
| Max (D)    | 38              | 42              | 52              | 59              | 41              | 43              | 45              | 46              | 43                                  | 46              | 53              | 59              | 5                          | 4               | 1               | 0               |

Source: ERT, 1986.

-- = Not Applicable

with the project during the daytime for the  $L_{50}$ ,  $L_{10}$ , and  $L_{eq}$  statistics. These estimates are within MPCA daytime standards of 60 dBA for  $L_{50}$ , 65 dBA for  $L_{10}$  and 63 dBA for  $L_{eq}$ . Therefore noise standards would not be expected to be exceeded. Noise increases due to the project above existing noise levels would be an increase of 6 dBA for  $L_{50}$ , 6 dBA for  $L_{10}$  and 3 dBA for  $L_{eq}$  at this receptor. These noise increases from the project would be noticeable at this receptor. As previously stated a 3 dBA or more increase is noticeable. During the nighttime, noise levels would be 42 dBA for  $L_{50}$ , 46 dBA for  $L_{10}$ , and 46 for  $L_{eq}$ , and within applicable MPCA standards. Since nighttime operations are not proposed, noise levels would remain unchanged from existing conditions.

At sensitive receptor 2, noise levels would be 64 dBA for  $L_{50}$ , 76 dBA for  $L_{10}$ , and 72 dBA for  $L_{eq}$  during the daytime. There is not anticipated to be any increase in noise levels at this receptor from the project because of its distance from the facility and the presence of considerable traffic on U.S. Route 10. The proposed facility would not contribute to noise levels above baseline (existing) conditions. The existing noise levels monitored exceed MPCA standards and are attributable to traffic on U.S. Route 10. During the evening, noise levels would be 48 dBA for  $L_{50}$ , 56 dBA and  $L_{10}$ , and 53 dBA for  $L_{eq}$ . These levels would be unchanged from existing conditions, resulting in no increase from the proposed project. These values equal or exceed the  $L_{10}$  and proposed  $L_{eq}$  standards; due to existing traffic volumes.

Sensitive receptor 3 would be exposed to noise from operation of the UPA power plant. It would be expected that daytime noise levels would be 55 dBA for  $L_{50}$ , 63 dBA for  $L_{10}$ , and 62 dBA for  $L_{eq}$  with the project. These noise levels would be within standards. The increases above existing conditions due to the power plant would be 4 dBA or less, and barely noticeable. Nighttime noise levels at this receptor were modeled to be 43 dBA for  $L_{50}$ , 54 dBA for  $L_{10}$ , and 52 dBA for  $L_{eq}$ , and within standards. Increases due to the project would be 3 dBA or less; and barely perceptible.

At sensitive receptor 4, noise levels were modeled to be 46 dBA for  $L_{50}$ , 53 dBA for  $L_{10}$ , and 59 dBA for  $L_{eq}$ ; within standards.

The increases above baseline for all noise statistics shown in Table 6.6.4 would be 5 dBA or less; and barely perceptible. Nighttime noise levels modeled at 38 dBA for  $L_{50}$ , 43 dBA for  $L_{10}$ , and 43 dBA for  $L_{eq}$ , well within standards. Increases due to the project would be 2 dBA or less, which is imperceptible.

In general, the impacts from the project would be barely noticeable or imperceptible during nighttime hours. At receptor one daytime noise levels would be significantly increased. Project related noise would not result in the violation of any applicable MPCA noise standards.

#### 1000 TPD Processing Facility Impacts

The 1000 tpd processing facility would include the same primary noise producing sources as the 500 tpd facility, namely: refuse trucks, front-end loader, fans, and mechanical equipment. The primary difference would be additional truck deliveries and the addition of a two-line processing operation. Two processing lines, rather than one, would be required to process the additional waste. Operations would however, generally be restricted to a 10-hour shift from 7 AM to 5 PM.

For the 1000 tpd scenario, two boilers would be required to burn about 700 tons per day of RDF at the UPA facility (500 tpd RDF processing facility requires only one boiler operational). UPA power plant operations would be on a 24-hour basis.

The noise modeling was based on the monitoring data for the Baltimore, Maryland and Pittsfield, Massachusetts facilities adjusted for size differences and distance to sensitive receptors.

Table 6.6-5 provides the results of the modeling for the 1000 tpd facility. At sensitive receptor 1, daytime noise levels would be 51 dBA for  $L_{50}$ , 54 dBA for  $L_{10}$ , and 56 dBA for  $L_{eq}$ , and within standards. Increases due to the project would be ten dBA or less and noticeable during the daytime at this receptor. Nighttime noise levels would remain unchanged due to the project, and are within standards.

Noise levels at sensitive receptor 2, currently exceed MPCA standards in both the daytime and nighttime. Noise levels are expected to remain unchanged from current levels.

TABLE 6.6-5

## EXPECTED FUTURE NOISE LEVELS - 1000 TPD FACILITY

| Location   | Baseline        |                 |                 |                 | Project Only    |                 |                 |                 | Future Noise Levels<br>With Project |                 |                 |                 | Increase Due<br>to Project |                 |                 |                 |
|------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-------------------------------------|-----------------|-----------------|-----------------|----------------------------|-----------------|-----------------|-----------------|
|            | L <sub>90</sub> | L <sub>50</sub> | L <sub>10</sub> | L <sub>eq</sub> | L <sub>90</sub> | L <sub>50</sub> | L <sub>10</sub> | L <sub>eq</sub> | L <sub>90</sub>                     | L <sub>50</sub> | L <sub>10</sub> | L <sub>eq</sub> | L <sub>90</sub>            | L <sub>50</sub> | L <sub>10</sub> | L <sub>eq</sub> |
| 1. Min (N) | 39              | 42              | 46              | 46              | --              | --              | --              | --              | 39                                  | 42              | 46              | 46              | 0                          | 0               | 0               | 0               |
| Max (D)    | 39              | 42              | 46              | 51              | 49              | 51              | 53              | 54              | 49                                  | 51              | 54              | 56              | 10                         | 9               | 8               | 5               |
| 2. Min (N) | 39              | 48              | 56              | 53              | --              | --              | --              | --              | 39                                  | 48              | 56              | 53              | 0                          | 0               | 0               | 0               |
| Max (D)    | 58              | 64              | 76              | 72              | 42              | 44              | 46              | 47              | 58                                  | 64              | 76              | 72              | 0                          | 0               | 0               | 0               |
| 3. Min (N) | 34              | 42              | 54              | 52              | 36              | 39              | 45              | 44              | 38                                  | 44              | 55              | 53              | 4                          | 2               | 1               | 1               |
| Max (D)    | 45              | 54              | 63              | 62              | 50              | 52              | 54              | 55              | 51                                  | 56              | 64              | 63              | 6                          | 2               | 1               | 1               |
| 4. Min (N) | 34              | 37              | 41              | 42              | 32              | 35              | 41              | 40              | 36                                  | 39              | 44              | 44              | 2                          | 2               | 3               | 2               |
| Max (D)    | 38              | 42              | 52              | 59              | 44              | 46              | 48              | 49              | 45                                  | 48              | 54              | 59              | 7                          | 6               | 2               | 0               |

Source: ERT, 1986.

-- = Not Applicable

At receptor 3, noise levels were modeled to be 56 dBA for  $L_{50}$ , 65 dBA for  $L_{10}$ , and 63 dBA for  $L_{eq}$ , and within daytime standards. Increases from the project would be perceptible for the  $L_{50}$ ,  $L_{10}$ , and  $L_{eq}$  metrics. Nighttime noise levels would be 44 dBA for  $L_{50}$ , 55 dBA for  $L_{10}$ , and 53 dBA for  $L_{eq}$ , and within standards. The increases due to the project would be 4 dBA or less, and barely perceptible.

Noise levels at receptor 4 were modeled to be 48 dBA for  $L_{50}$ , 54 dBA for  $L_{10}$ , and 59 dBA for  $L_{eq}$ , and within daytime standards. During the nighttime, noise levels would be 39 dBA for  $L_{50}$ , 44 dBA for  $L_{10}$ , and 44 dBA for  $L_{eq}$ , and within standards. Increases from the project in the daytime would be 6 dBA for  $L_{50}$  which will be noticeable and 2 dBA or less for the  $L_{10}$  and  $L_{eq}$  statistics. Increases during the nighttime would generally be imperceptible (3 dBA or less).

#### 1500 TPD Processing Facility Impacts

The 1500 tpd processing facility would most likely consist of a two processing line facility operating on a two-shift basis. Each shift would be about 8 hours. The first shift would be from 7 AM to 3 PM and the second from 3 PM to 11 PM. Truck deliveries would primarily take place during daylight hours. Noise producing activity would occur during the nighttime as a result of the second shift. Additional truck deliveries would be required to accommodate the increased waste.

For the 1500 tpd scenario, three boilers would be required to burn about 1050 tpd of RDF at the UPA facility. Operations would be on a 24-hour basis. Truck deliveries would be primarily during daylight hours.

Table 6.6-6 provides the results of the modeling for the 1500 tpd operation. Noise levels at receptor one would be 52 dBA for  $L_{50}$ , 54 dBA for  $L_{10}$ , and 56 dBA for  $L_{eq}$ , and within standards. The increases from the project would be perceptible at this receptor. During the nighttime, noise levels would be 44 dBA for  $L_{50}$ , 49 dBA

TABLE 6.6-6

## EXPECTED FUTURE NOISE LEVELS - 1500 TPD FACILITY

| Location   | Baseline        |                 |                 |                 | Project Only    |                 |                 |                 | Future Noise Levels<br>With Project |                 |                 |                 | Increase Due<br>to Project |                 |                 |                 |
|------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-------------------------------------|-----------------|-----------------|-----------------|----------------------------|-----------------|-----------------|-----------------|
|            | L <sub>90</sub> | L <sub>50</sub> | L <sub>10</sub> | L <sub>eq</sub> | L <sub>90</sub> | L <sub>50</sub> | L <sub>10</sub> | L <sub>eq</sub> | L <sub>90</sub>                     | L <sub>50</sub> | L <sub>10</sub> | L <sub>eq</sub> | L <sub>90</sub>            | L <sub>50</sub> | L <sub>10</sub> | L <sub>eq</sub> |
| 1. Min (N) | 39              | 42              | 46              | 46              | 36              | 39              | 45              | 44              | 41                                  | 44              | 49              | 48              | 2                          | 2               | 3               | 2               |
| Max (D)    | 39              | 42              | 46              | 51              | 49              | 51              | 53              | 54              | 49                                  | 52              | 54              | 56              | 10                         | 10              | 8               | 5               |
| 2. Min (N) | 39              | 48              | 56              | 53              | 28              | 31              | 37              | 36              | 39                                  | 48              | 56              | 53              | 0                          | 0               | 0               | 0               |
| Max (D)    | 58              | 64              | 76              | 72              | 42              | 44              | 46              | 47              | 58                                  | 64              | 76              | 72              | 0                          | 0               | 0               | 0               |
| 3. Min (N) | 34              | 42              | 54              | 52              | 36              | 39              | 45              | 44              | 38                                  | 44              | 55              | 53              | 4                          | 2               | 1               | 1               |
| Max (D)    | 45              | 54              | 63              | 62              | 50              | 52              | 54              | 55              | 51                                  | 56              | 64              | 63              | 6                          | 2               | 1               | 1               |
| 4. Min (N) | 34              | 37              | 41              | 42              | 32              | 35              | 41              | 40              | 36                                  | 39              | 44              | 44              | 2                          | 2               | 3               | 2               |
| Max (D)    | 38              | 42              | 52              | 59              | 44              | 46              | 48              | 49              | 45                                  | 48              | 54              | 59              | 7                          | 6               | 2               | 0               |

Source: ERT, 1986.

for  $L_{10}$ , and 48 dBA for  $L_{eq}$ , and within noise standards. Noise levels due to the project would be increased by 3 dBA or less in the nighttime, and barely perceptible.

At receptor 2 daytime and nighttime noise levels would exceed or equal standards. The project would not increase noise levels at this receptor. As a result the project will not contribute to the violation of noise standards.

Noise levels at receptor 3 were modeled to be 56 dBA for  $L_{50}$ , 64 dBA for  $L_{10}$ , and 63 dBA for  $L_{eq}$ , and within daytime standards. Nighttime noise levels would be 44 dBA for  $L_{50}$ , 55 dBA for  $L_{10}$ , and 53 dBA for  $L_{eq}$ . Increases due to the project for the  $L_{50}$ ,  $L_{10}$ , and  $L_{eq}$  standard statistics would be imperceptible for the daytime and nighttime periods.

Noise levels at receptor 4 are expected to be 48 dBA for  $L_{50}$ , 54 dBA for  $L_{10}$ , and 59 dBA for  $L_{eq}$ , within daytime standards. Nighttime noise levels would be 39 dBA for  $L_{50}$ , 44 dBA for  $L_{10}$ , and 44 dBA for  $L_{eq}$ , and within standards. Daytime noise level increases from the project would be 7 and 6 dBA for the  $L_{90}$  and  $L_{50}$  statistics, which would be noticeable. Nighttime noise level increases due to the project would be 3 dBA or less, and barely perceptible.

In summary, operation of a 1500 tpd facility would not result in the violation of any applicable noise standards. Increased noise levels from nighttime operations would generally be imperceptible.

#### 6.6.3 Construction Impacts

During construction of the proposed RDF facility, considerable activity would take place on-site. This would include site preparation and construction of the facility. Construction would occur over a 24-month period. Peak construction would take place during a 3 to 6-month period. During this time heavy construction truck activity would occur on site. Construction activity would generally occur during daylight hours.

During the peak construction activity, there would be a perceptible increase in noise levels at receptor one from 5 to 12 dBA as shown in Table 6.6-7. This increase is expected to be limited to

**TABLE 6.6-7**  
**NOISE LEVELS FROM CONSTRUCTION ACTIVITY**

| <u>Location</u> | <u>Baseline</u>       |                       |                       |                       | <u>Construction Noise</u> |                       |                       |                       | <u>Future Noise Levels<br/>With Construction</u> |                       |                       |                       | <u>Increase due<br/>to Project</u> |                       |                       |                       |
|-----------------|-----------------------|-----------------------|-----------------------|-----------------------|---------------------------|-----------------------|-----------------------|-----------------------|--------------------------------------------------|-----------------------|-----------------------|-----------------------|------------------------------------|-----------------------|-----------------------|-----------------------|
|                 | <u>L<sub>90</sub></u> | <u>L<sub>50</sub></u> | <u>L<sub>10</sub></u> | <u>L<sub>eq</sub></u> | <u>L<sub>90</sub></u>     | <u>L<sub>50</sub></u> | <u>L<sub>10</sub></u> | <u>L<sub>eq</sub></u> | <u>L<sub>90</sub></u>                            | <u>L<sub>50</sub></u> | <u>L<sub>10</sub></u> | <u>L<sub>eq</sub></u> | <u>L<sub>90</sub></u>              | <u>L<sub>50</sub></u> | <u>L<sub>10</sub></u> | <u>L<sub>eq</sub></u> |
| 1. Day          | 39                    | 42                    | 46                    | 51                    | 42                        | 48                    | 58                    | 56                    | 44                                               | 49                    | 58                    | 57                    | 5                                  | 7                     | 12                    | 6                     |
| 2. Day          | 58                    | 64                    | 76                    | 72                    | 34                        | 40                    | 50                    | 48                    | 58                                               | 64                    | 76                    | 72                    | 0                                  | 0                     | 0                     | 0                     |
| 3. Day          | 45                    | 54                    | 63                    | 62                    | --                        | --                    | --                    | --                    | --                                               | --                    | --                    | --                    | --                                 | --                    | --                    | --                    |
| 4. Day          | 38                    | 42                    | 52                    | 59                    | --                        | --                    | --                    | --                    | --                                               | --                    | --                    | --                    | --                                 | --                    | --                    | --                    |

Source: ERT, 1985

-- = Not Applicable

daylight hours and a brief 3-6 month period. There would not be any increase at the other receptors due to their distance from the proposed processing plant. There are not any relevant standards for construction activity.

#### 6.7 Social and Economic Conditions

The proposed facility would create employment opportunities during both the construction and operational phases of the project. Approximately 60 persons would be employed during construction, and 35-45 during operation, depending upon the facility size selected. Related spin-off employment may arise from industrial, retail sales, and commercial retail businesses which may service employees at the proposed facility. Given the proposed facility's location proximate to two labor market areas, it is expected employment opportunities created by the proposed project could be adequately satisfied from the available base of labor.

As indicated in Section 5.7 and Tables 5.7-1 and 5.7-2, there is a wealth of experienced workers in the labor market areas in construction, service, trades, and administrative and professional occupations. Thus, available and qualified persons can fill the relatively small number of job openings that would be created by the proposed facility.

Given the already available labor pool, it is anticipated that there would not be an influx of persons to the area resulting from the proposed facility. As a result, there would be a negligible, if any, impact of the facility on population and housing in Elk River and nearby Anoka County. The facility would have a minor positive effect on the economy of the area, however, due to increased tax revenues to the host community.

The facility will generate additional tax revenue to the City of Elk River. Based upon a comparison to other facilities and project design details for fire and safety protection, it is not anticipated that the facility will require significant emergency services from the City of Elk River.

## 6.8 Health and Safety

### 6.8.1 Introduction

The combustion of municipal solid waste has been found to result in the emission of trace quantities of various heavy metals and organic materials. Because of the potential toxicity of many of these compounds, it is important that the emissions from facilities burning municipal refuse be kept to sufficiently low levels so as to not present any risks to public health. This section addresses the emission of such compounds, often termed non criteria pollutants, from the proposed Anoka County RDF facility and the potential for associated human health effects. These compounds are identified as non-criteria pollutants since specific standards have not been established by regulatory agencies such as the U.S. EPA for their emission. The assessment is based on an analysis that compares the amounts of these pollutants to which the population will be exposed with the known toxic effects of the pollutants of concern. Absent actual operating data, estimates of non-criteria pollutant emissions must be developed based on experience with operating facilities. For this study, a data base was developed that was as comprehensive as possible including operating data for both RDF and mass burn facilities.

The emissions inventory includes data on 21 facilities operated in North America and Europe burning municipal waste, equipped with some form of pollution control device, and for which test data were verifiable and scientifically defensible. It was also required that some minimum information on plant operations be available including: approximate age, type of fuel burned, technology, and appropriate boiler temperature.

### 6.8.2 Literature Review

A comprehensive review of available literature on the subject of toxic emissions from municipal refuse incinerators was conducted in order to develop an extensive but representative data base on flue gas emissions. Data available for existing solid waste resource recovery

facilities was compiled and included the most recent test results, specifically those for the Signal Resco facility in Peekskill, New York (Westchester Resco facility).

#### 6.8.3 Emissions Data Base Development

The data base of emissions from municipal incinerators was refined to select data representative of potential emissions from the proposed facility. The following four criteria were used in selecting the data for inclusion in the analyses.

##### Municipal Waste Incineration

All facilities included in the data base burn exclusively municipal solid waste in some form. Facilities which burn other fuels such as coal, would obviously emit pollutants different from that for a waste burning facility; and would therefore not be applicable to the proposed project.

##### Information Regarding Facility Operations

Combustion efficiency is a useful indicator to describe the results of the burning process. Although it has not been conclusively demonstrated that there is a one-to-one correlation between combustion efficiency and emissions of dioxins and furans, it appears that "in most cases the combustion efficiency has been high and emissions low." Dioxins from Scandinavian Waste Combustion Plants, Thomas Oberg, Environmental Consultant at Studsvik AB, 5-611-82, NyKoping, Sweden 98s). This paper suggests that some relationship may exist between increased temperatures and reduced dioxin and furan emissions, although this has not been conclusively proven.

Some information on the facility tested is essential to determine if the reported test results are valid. If data such as the age of a facility is not available, the emissions data should be excluded. For example, test data for a facility built and designed using 1950's technology would not be expected to operate as efficiently as a modern

plant or an older plant which has been significantly modified to incorporate the most recent combustion technology. Plant operating data were obtained for location, incinerator type, capacity, and technology utilized.

The study previously mentioned by Oberg indicates that "Evidently flue gas emissions of chlorinated aromatics can be reduced both through improvements of combustion, as well as by different flue gas cleaning systems. A first step to reduce high emission should always be to improve combustion conditions since, such measures are the most effective" (Oberg, Op Cit, p.3). Efficiency is related to three operational parameters: time, temperature, and turbulence. Residence time and high temperatures result in a more complete burning of fuels as evidenced by reduced emissions of CO. The mixing of air exposes increased surface area thus allowing increased oxygen to react with otherwise unburnt fuels.

The emissions tests referred to by Oberg were performed at two Swedish incinerators with results indicating a reduction in CO emissions from 1520 to 190 parts per million (ppm) with a consequent reduction in TCDD from 1500 nanograms per cubic meter ( $\text{ng}/\text{m}^3$ ) to  $26 \text{ ng}/\text{m}^3$ . At the Avesta facility CO was reduced from 100 ppm to 20 ppm and TCDD from 130 to  $0.18 \text{ ng}/\text{m}^3$ .

#### Pollution Control

Facilities included in the data base must have been equipped with some form of pollution control device. Journal articles have indicated that both ESPs and scrubber/baghouse pollution control devices can be effective in removing PCDD and PCDF emissions. An article entitled "Joy/Niro Spray Dryer Absorption Flue Gas Cleaning System" (J.R. Donnelly, Joy Manufacturing Company, Acid Gas Dioxin Control Conference, Wash. D.C. p.19 November, 1985), indicated that initial measurements have shown high removal efficiencies (for dry scrubbers in particular) for dioxins and furans.

In a report prepared by Floyd Hasselries, P.E., "Refuse Combustion and Effects on Trace Organic Emissions," presented at the U.S. Conference of Mayors, Fifth Annual Resource Recovery Conference, March

19-21, 1986, it is suggested that well designed and optimally functioning incinerators operate with low CO emissions and subsequently low emissions of dioxins and furans. This article suggests that dioxin and furan emissions are a function of operating characteristics including: temperature, residence time, pollution control equipment, and maintenance procedures. The proposed facility will be equipped with pollution control equipment.

#### Data Quality Must be Verifiable

Each data set was examined in light of a number of quality control/quality assurance criteria in an effort to establish reliability. If the data could not be verified, they would not be utilized in the data base. The data quality criteria in general conform to those adopted by the United States Environmental Protection Agency for use with state-of-the-art flue gas monitoring concerning sample location, sample duration and collection, instrument location, and method blanks to name only a few (Harris, 1983; EPA 1985).

#### 6.8.4 Facilities Included in Emissions Data Base

Table 6.8-1 lists the facilities which were included in the data base for development of an emissions rate for the proposed project. The first step was to include those facilities meeting the selection criteria specified in Section 6.8.3. Twenty one facilities located in North America and Europe met the primary selection criteria. Of that sample of acceptable data, four RDF facilities were included. Since the emissions from the RDF burning facilities varies for this small sample, but falls within the range of values for mass burn plants, they were included with all other incineration facilities. It is possible that waste composition (i.e., unprocessed MSW versus RDF) may affect dioxin and furan emissions, but there is no evidence of such an effect in the data.

Data from six Italian facilities were excluded from the data base due to a lack of information pertaining to facility operations. The information available on the results of the testing of the Italian

TABLE 6.8-1  
EMISSIONS DATA BASE USED IN DEIS

| Country                                                                           | Site | Run | PCDD EMISSIONS (ng/NM*3) |        |                  |        |        |        |        |                | PCDF EMISSIONS (ng/NM*3) |         |         |         |         |        |                |         | TOTAL<br>PCDD +<br>PCDF | Particulate<br>(P) and/or<br>Gaseous (G) | Ref. |
|-----------------------------------------------------------------------------------|------|-----|--------------------------|--------|------------------|--------|--------|--------|--------|----------------|--------------------------|---------|---------|---------|---------|--------|----------------|---------|-------------------------|------------------------------------------|------|
|                                                                                   |      |     | T3CDD                    | T4CDD  | 2,3,7,8<br>T4CDD | P5CDD  | H6CDD  | H7CDD  | 08CDD  | P4 - P8<br>CDD | T3CDF                    | T4CDF   | P5CDF   | H6CDF   | H7CDF   | 08CDF  | P4 - P8<br>CDF |         |                         |                                          |      |
| Average of All Published Data by Individual Facility                              |      |     |                          |        |                  |        |        |        |        |                |                          |         |         |         |         |        |                |         |                         |                                          |      |
| Mass Burn Facilities                                                              |      |     |                          |        |                  |        |        |        |        |                |                          |         |         |         |         |        |                |         |                         |                                          |      |
| WESTCHESTER, N.Y.                                                                 |      |     |                          | 2.11   | 0.21             | 2.11   | 2.88   | 4.10   | 6.57   | 17.76          |                          | 22.20   | 12.95   | 13.39   | 7.78    | 0.28   | 56.60          | 74.36   |                         |                                          |      |
| CHICAGO, N.W., ILL.                                                               |      |     | 12.67                    | 6.27   | 4.33             |        | 16.33  | 7.57   | 2.53   | 32.70          | 300.00                   | 89.67   |         | 62.00   | 7.47    | 0.60   | 159.74         | 192.44  |                         |                                          |      |
| HAMPTON, VA.                                                                      |      |     | 46.00                    | 309.25 |                  | 900.38 | 659.75 | 493.25 | 128.50 | 2571.13        | 1992.40                  | 1506.50 | 4300.80 | 886.25  | 534.63  | 37.13  | 7273.38        | 9844.50 |                         |                                          |      |
| USA, (MAYPORT)                                                                    |      |     |                          | 3.57   | 1.67             |        |        |        |        | 3.57           |                          | 21.03   |         |         |         | 21.63  | 24.60          |         |                         |                                          |      |
| MONTREAL, CANADA                                                                  |      |     |                          | 0.06   |                  | 0.06   | 0.09   | 0.10   | 0.19   | 0.50           |                          | 0.12    | 0.10    | 0.06    | 0.04    | 0.03   | 0.37           | 0.87    |                         |                                          |      |
| QUEBEC, CANADA                                                                    |      |     |                          | 4.06   |                  | 14.65  | 15.46  | 12.23  | 1.70   | 48.10          |                          | 45.87   | 35.55   | 38.97   | 8.38    | 0.64   | 129.41         | 177.51  |                         |                                          |      |
| Refuse Derived Fuel Facilities                                                    |      |     |                          |        |                  |        |        |        |        |                |                          |         |         |         |         |        |                |         |                         |                                          |      |
| SHARU, CANADA                                                                     |      |     |                          | 760.00 |                  | 713.85 | 686.15 | 298.46 | 229.23 | 2687.69        |                          | 2560.77 | 2261.54 | 1063.00 | 193.85  | 53.85  | 6133.00        | 4777.92 |                         |                                          |      |
| ALBANY, N.Y.                                                                      |      |     |                          | 15.73  | 0.41             | 132.61 | 112.65 | 103.12 | 8.65   | 134.74         |                          | 37.13   | 30.37   | 6.53    | 1.06    | 0.00   | 49.79          | 184.53  |                         |                                          |      |
| OCC.CHEM., N.Y.                                                                   |      |     |                          | 93.84  | 2.86             | 99.28  | 224.00 | 225.50 | 115.00 | 757.62         |                          | 199.00  | 339.00  | 168.00  | 67.65   | 13.53  | 787.98         | 1545.60 |                         |                                          |      |
| USA, (MPAFB)                                                                      |      |     |                          | 30.00  | 9.60             | 0.00   | 0.00   | 0.00   | 0.00   | 30.00          |                          | 312.00  | 0.00    | 0.00    | 0.00    | 0.00   | 312.00         | 342.00  |                         |                                          |      |
| AVERAGE OF ALL NORTH AMERICAN FACILITIES - ALL TECHNOLOGIES - BY FACILITY AVERAGE |      |     |                          |        |                  |        |        |        |        |                |                          |         |         |         |         |        |                |         |                         |                                          |      |
| Average =                                                                         |      |     |                          | 122.49 | 1.91             | 194.29 | 171.73 | 114.43 | 49.24  | 628.38         |                          | 229.24  | 479.51  | 698.84  | 223.83  | 82.00  | 10.61          | 1492.34 | 1716.43                 |                                          |      |
| Standard Deviation =                                                              |      |     |                          | 230.92 | 2.93             | 334.79 | 259.72 | 162.21 | 76.27  | 1023.04        |                          | 594.49  | 817.16  | 1375.30 | 300.58  | 161.49 | 10.27          | 2627.02 | 3047.88                 |                                          |      |
| Maximum =                                                                         |      |     |                          | 760.00 | 9.60             | 900.38 | 686.15 | 493.25 | 229.23 | 2687.69        |                          | 1992.40 | 2560.77 | 4300.80 | 1063.00 | 534.63 | 53.85          | 7273.38 | 9844.50                 |                                          |      |
| Minimum =                                                                         |      |     |                          | 0.06   | 0.00             | 0.00   | 0.00   | 0.00   | 0.00   | 0.50           |                          | 0.00    | 0.12    | 0.00    | 0.00    | 0.00   | 0.37           | 0.87    |                         |                                          |      |

TABLE 6.8-1 (Continued)

| Country                                          | Site       | Run | PCDD EMISSIONS (ng/NM <sup>3</sup> ) |          |                  |        |          |         |          | PCDF EMISSIONS (ng/NM <sup>3</sup> ) |       |       |       |          |       |          | TOTAL<br>PCDD +<br>PCDF | Particulate<br>(P) and/or<br>Gaseous (G) | Ref. |
|--------------------------------------------------|------------|-----|--------------------------------------|----------|------------------|--------|----------|---------|----------|--------------------------------------|-------|-------|-------|----------|-------|----------|-------------------------|------------------------------------------|------|
|                                                  |            |     | T3CDD                                | T4CDD    | 2,3,7,8<br>T4CDD | P5CDD  | H6CDD    | H7CDD   | O8CDD    | TOTAL<br>PCDD                        | T3CDF | T4CDF | P5CDF | H6CDF    | H7CDF | O8CDF    |                         |                                          |      |
| Average of all European Runs by Facility Average |            |     |                                      |          |                  |        |          |         |          |                                      |       |       |       |          |       |          |                         |                                          |      |
| Belgium                                          | Beveren    |     |                                      | 3.6      |                  | 6.5    | 35.0     | 87.5    | 125.0    | 257.6                                |       | 16.0  | 33.0  | 35.0     | 47.5  | 40.0     | 171.5                   | 429.1                                    |      |
|                                                  | Unknown    |     |                                      | 30.0     | 2.4              | 215.0  | 119.0    | 136.5   | 177.5    | 678.0                                |       | 156.0 | 198.5 | 269.0    | 354.5 | 318.5    | 1296.5                  | 1974.5                                   |      |
| Italy                                            | Valmadrera |     |                                      | 126.9    |                  | 199.1  | 366.0    | 206.3   | 125.9    | 1104.1                               |       | 309.0 | 250.3 | 314.2    | 215.1 | 123.8    | 1212.3                  | 2316.4                                   |      |
|                                                  | Milan I    |     |                                      | 15.3     | 2.0              | 0.0    | 0.0      | 0.0     | 804.3    | 819.7                                |       | 0.0   | 0.0   | 0.0      | 0.0   | 584.3    | 584.3                   | 1404.0                                   |      |
|                                                  | Milan II   |     |                                      | 0.2      | 0.0              | 0.0    | 0.0      | 0.0     | 113.0    | 113.2                                |       | 0.0   | 0.0   | 0.0      | 0.0   | 90.9     | 90.9                    | 204.1                                    |      |
|                                                  | Busto      |     |                                      | 0.8      | 0.1              | 0.0    | 0.0      | 0.0     | 33.0     | 33.8                                 |       | 0.0   | 0.0   | 0.0      | 0.0   | 44.5     | 44.5                    | 78.3                                     |      |
|                                                  | Desio      |     |                                      | 0.6      | 0.2              | 0.0    | 0.0      | 0.0     | 75.0     | 75.6                                 |       | 0.0   | 0.0   | 0.0      | 0.0   | 67.0     | 67.0                    | 142.6                                    |      |
| Netherlands                                      | Zaandstad  |     |                                      | 57.1     |                  | 231.3  | 439.9    | 347.1   | 451.8    | 1527.2                               |       | 161.1 | 271.6 | 528.4    | 293.0 | 67.6     | 1321.8                  | 2849.0                                   |      |
| Sweden                                           | Unknown    |     |                                      | 0        | 0.0              | 0.0    | 40.3     | 234.1   | 366.7    | 641.0                                |       | 0.0   | 0.0   | 0.0      | 0.0   | 0.0      | 0.0                     | 641.0                                    |      |
|                                                  | Avesta     |     |                                      | 65.09    | 0                | 225.6  | 0        | 0       | 0        | 290.7                                |       | 226   | 310.5 | 0        | 0     | 0        | 536.5                   | 827.2                                    |      |
| Switzerland                                      | Zurich     |     |                                      | 4.0      | 0.2              | 11.0   | 24.9     | 24.1    | 49.1     | 113.1                                |       | 22.3  | 27.3  | 10.7     | 12.4  | 8.2      | 88.9                    | 202.0                                    |      |
| Average of all =<br>European Runs By Facility    |            |     |                                      |          |                  |        |          |         |          |                                      |       |       |       |          |       |          |                         |                                          |      |
|                                                  | n          | =   |                                      | 11       | 11               | 11     | 11       | 11      | 11       | 10                                   |       | 11    | 11    | 12       | 12    | 11       | 20                      | 20                                       |      |
| Standard Deviation =                             |            |     |                                      | 38.6     | 0.8              | 103.8  | 150.6    | 124.7   | 229.7    | 441.0                                |       | 106.8 | 122.8 | 168.0    | 125.6 | 169.2    | 453.5                   | 854.9                                    |      |
| Maximum =                                        |            |     |                                      | 126.8823 | 2.385            | 231.25 | 439.8571 | 347.125 | 804.3333 | 1527.160                             |       | 309   | 310.5 | 528.4285 | 354.5 | 584.3333 | 1321.839                | 2849                                     |      |
| Minimum =                                        |            |     |                                      | 0        | 0                | 0      | 0        | 0       | 0        | 0                                    |       | 0     | 0     | 0        | 0     | 0        | 0                       | 0                                        |      |

facilities was reported in Chemosphere. Vol.II. No.9, pp.859-856. 1982. Unfortunately, the article does not provide any information on the type of facilities tested, their age, operating temperature or pollution control devices. As a result it is not apparent that these facilities are representative of a modern resource recovery facility, and therefore, were excluded from the data base. The specific facilities excluded include: five German facilities; Italy 1 through 6; Sweden Eksjo; and two U.S. facilities.

#### 6.8.5 Emission Rates

Emission projections for Dioxins and Furans were calculated using the mass burn and RDF technology data base. An average emissions value was calculated based on an average for each facility analyzed. In addition, an emissions factor for the facility showing the highest emissions (SWARU) was calculated. This is believed to be representative of the worst expected emissions.

Table 6.8-1 summarizes emission factors for each of the facilities. An average emission rate of 1535 nanograms per cubic meter ( $\text{ng}/\text{m}^3$ ) for total PCDD and PCDF was calculated with a standard deviation of  $2725 \text{ ng}/\text{m}^3$  (a nanogram equals one billionth ( $10^{-9}$ ) of a gram). Generally, the highest emissions recorded for the facilities included in the analysis were  $8820 \text{ ng}/\text{m}^3$  for total PCDD and PCDF from the SWARU Facility in Canada.

As the table shows six North American mass burn, four North American RDF, and eleven European facilities were included in the emissions data base. The average PCDD & PCDF emissions rate for the ten North American facilities was  $2,120 \text{ ng}/\text{m}^3$ . In comparison the average PCDD & PCDF emissions rate for the eleven European facilities was  $1010 \text{ ng}/\text{m}^3$  with a standard deviation of  $980 \text{ ng}/\text{m}^3$ . The emissions rate for the North American facilities is higher than for the European facilities. For all 21 North American and European facilities combined, the average total PCDD & PCDF emissions rate was  $1535 \text{ ng}/\text{m}^3$  with a standard deviation of  $2725 \text{ ng}/\text{m}^3$  as previously described. This average emissions rate of  $1535 \text{ ng}/\text{m}^3$  for PCDD & PCDF was utilized in calculating health risk for the average expected case.

For comparative purposes and in order to evaluate the impact of excluding certain data, a detailed calculation of unadjusted emissions of PCDD & PCDF for 35 North American and European facilities was also undertaken. The 35 facilities included data for several Italian facilities (Italy 1-6) which were excluded from the DEIS as described in Section 6.8.4 due to a lack of sufficient data on facility operating characteristics. Inclusion of the entire 35 facilities results in a total PCDD & PCDF emissions rate of  $1,580 \text{ ng/m}^3$  with a standard deviation of about  $2900 \text{ ng/m}^3$ , in comparison to the average used in this DEIS of  $1535 \text{ ng/m}^3$ .

#### 6.8.6 Metals and Other Emissions

A review of the literature for metal and other emissions revealed data on emissions for several incinerators. Table 6.8-2 shows the data base used for development of the emissions rates. The average emissions rates are shown as well as the standard deviation for all the facilities analyzed. An average emissions rate was utilized in the DEIS. A worst case emissions rate was also used in the DEIS based primarily upon the SWARU RDF facility, which has the highest emissions of the facilities included in the data base.

#### 6.8.7 Hazard Identification

The following compounds were identified as worthy of further detailed risk assessment. The compounds for which a detailed risk assessment was undertaken are:

- Arsenic
- Beryllium
- Cadmium
- Chlorinated Benzenes
- Chlorinated Phenols
- Chromium
- Nickel
- Polychlorinated Dibenzodioxins and Dibenzofurans (PCDD and PCDF)
- PAHs

Table 6.8-2: Organics and Metals Emissions Data Base

| Chlorinated Biphenyl (PCB) Emissions (ug/M <sup>3</sup> ) |                                  |     |                            |                          |                           |                             |                             |                            |                             |                                                       |                                 |
|-----------------------------------------------------------|----------------------------------|-----|----------------------------|--------------------------|---------------------------|-----------------------------|-----------------------------|----------------------------|-----------------------------|-------------------------------------------------------|---------------------------------|
| Country                                                   | Site                             | Run | mono<br>chloro<br>biphenyl | di<br>chloro<br>biphenyl | tri<br>chloro<br>biphenyl | tetra<br>chloro<br>biphenyl | penta<br>chloro<br>biphenyl | hexa<br>chloro<br>biphenyl | total<br>chloro<br>biphenyl | REFERENCE                                             | ENVIRONMENTAL<br>CONTROL DEVICE |
| MASS BURN INCINERATORS                                    |                                  |     |                            |                          |                           |                             |                             |                            |                             |                                                       |                                 |
| USA                                                       | Chicago<br>Northwest             | 1   | NA                         | 0.0058                   | 0.0076                    | 0.0092                      | 0.0023                      | NA                         | 0.0249                      | EPA Study<br>[560/5-83-004]<br>1983                   | ESPs                            |
|                                                           |                                  | 2   | NA                         | 0.006                    | 0.0043                    | 0.0015                      | 0.001                       | NA                         | 0.0128                      |                                                       |                                 |
|                                                           |                                  | 3   | NA                         | 0.04                     | 0.036                     | 0.013                       | 0.0045                      | NA                         | 0.0935                      |                                                       |                                 |
| USA                                                       | Hampton<br>Virginia<br>1983      | 3   | NA                         | 0.002                    | 0.03                      | 0.431                       | 0.017                       | 0.004                      | 1.284                       | 4                                                     |                                 |
|                                                           |                                  | 5   | NA                         | 0.002                    | 0.002                     | 0.002                       | 0.002                       | 0.002                      | 0.01                        |                                                       |                                 |
|                                                           |                                  | 7   | NA                         | 0.002                    | 0.051                     | 0.075                       | 0.002                       | 0.048                      | 0.258                       |                                                       |                                 |
| USA                                                       | Hampton<br>Virginia<br>1984      | 1   | 0.0005                     | 0.071                    | 0.0005                    | 0.0005                      | 0.056                       | 0.0005                     | 0.129                       | 1                                                     |                                 |
|                                                           |                                  | 2   | 0.18                       | 0.7                      | 0.13                      | 0.025                       | 0.001                       | 0.013                      | 1.049                       |                                                       |                                 |
|                                                           |                                  | 3   | 0.2                        | 0.2                      | 0.32                      | 0.061                       | 0.011                       | 0.007                      | 0.799                       |                                                       |                                 |
|                                                           |                                  | 4   | 0.23                       | 0.52                     | 0.081                     | 0.018                       | 0.019                       | 0.026                      | 0.894                       |                                                       |                                 |
|                                                           |                                  | 5   | 0.091                      | 0.3                      | 0.06                      | 0.002                       | 0.0005                      | 0.0005                     | 0.454                       |                                                       |                                 |
| Canada                                                    | Toronto<br>Ontario               | 1   |                            |                          |                           |                             |                             |                            | 0.029                       | 5                                                     |                                 |
|                                                           |                                  | 2   |                            |                          |                           |                             |                             |                            | 0.00                        |                                                       |                                 |
|                                                           |                                  | 3   |                            |                          |                           |                             |                             |                            | NA                          |                                                       |                                 |
| REFUSE DERIVED FUEL FACILITIES                            |                                  |     |                            |                          |                           |                             |                             |                            |                             |                                                       |                                 |
| Canada                                                    | Hamilton<br>Wentworth<br>Ontario | 1   |                            |                          |                           |                             |                             |                            | 0.182                       | Canada's<br>Ministry<br>of the<br>Environment<br>1984 | ESPs                            |
|                                                           |                                  | 4   |                            |                          |                           |                             |                             |                            | 0.01                        |                                                       |                                 |
|                                                           |                                  | 5   |                            |                          |                           |                             |                             |                            | 0.324                       |                                                       |                                 |

Table 6.8-2 cont.

|                                                                        |                      |
|------------------------------------------------------------------------|----------------------|
| 6                                                                      | 0.009                |
| 7                                                                      | 0.286                |
| 8                                                                      | 0.087                |
| 9                                                                      | 0.202                |
| 10                                                                     | 0.1                  |
| 11                                                                     | 2.064                |
| 12                                                                     | 0.609                |
| 13                                                                     | 0.936                |
| 14                                                                     | 0.347                |
| 15                                                                     | 0.687                |
| Average 0.063772 0.168072 0.1384 0.058010 0.017845 0.009181 0.408896   |                      |
| Count                                                                  | 11 11 11 11 11 11 27 |
| Std Dev 0.089870 0.230085 0.235803 0.120337 0.025512 0.014432 0.485505 |                      |

Table 6.8-2 cont.

| METAL EMISSIONS (ug/g)         |                     |     |          |          |          |          |          |          |          |          |          |          |          |          |          |          |                   |                                 |
|--------------------------------|---------------------|-----|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-------------------|---------------------------------|
| Country                        | Site                | Run | Ni       | Cr       | Cd       | Be       | As       | Pb       | Mn       | Hg       | Cu       | Se       | Sn       | V        | Zn       | TOTAL    | REFERENCE         | ENVIRONMENTAL CONTROL DEVICE    |
| MASS BURN INCINERATORS         |                     |     |          |          |          |          |          |          |          |          |          |          |          |          |          |          |                   |                                 |
| USA                            | Alexandria Virginia | 1   | 2.00E+02 | 4.90E+02 | 1.10E+03 | NA       | 2.10E+02 | 9.70E+04 | 1.50E+03 | NA       | 2.00E+03 | 2.30E+01 | 1.07E+04 | NA       | 1.20E+05 | 2.33E+05 | Greenberg 1978    | SPRAY CHAMBER                   |
| USA                            | SWRC #1 Wash. D.C.  | 1   | 1.70E+02 | 8.70E+02 | 1.90E+03 | NA       | 3.10E+02 | 7.70E+04 | 4.10E+02 | NA       | 1.50E+03 | 3.90E+01 | 1.00E+04 | NA       | 1.30E+05 | 2.23E+05 | Greenberg 1978    | CYCLONE & ESPs                  |
| USA                            | Nicosia Chicago     | 1   | 7.90E+01 | 1.05E+02 | 1.50E+03 | NA       | 2.00E+02 | 6.90E+04 | 2.70E+02 | NA       | 1.70E+03 | 4.90E+01 | 1.29E+04 | NA       | 1.10E+05 | 1.95E+05 | Greenberg 1978    | SPRAY CHAMBER & SCRUBBING TOWER |
| USA                            | Braintree MA        | 1   | NA       | NA       | 2.14E+03 | NA       | 1.42E+02 | 4.27E+04 | NA       | 1.06E+02 | 1.15E+03 | NA       | NA       | NA       | NA       | 4.63E+04 | Golembiewski 1979 | ESP                             |
|                                |                     | 2   | NA       | NA       | 1.01E+03 | NA       | 1.06E+02 | 3.60E+04 | NA       | 1.60E+02 | 1.52E+03 | NA       | NA       | NA       | NA       | 3.95E+04 |                   |                                 |
|                                |                     | 3   | NA       | NA       | 1.25E+03 | NA       | 1.06E+02 | 6.35E+04 | NA       | 9.73E+01 | 1.50E+03 | NA       | NA       | NA       | NA       | 6.66E+04 |                   |                                 |
| Italy                          | Various             | 1   | 4.50E+02 | 1.10E+03 | 4.40E+02 | NA       | 1.10E+02 | 1.00E+04 | 1.12E+03 | 3.50E+01 | 1.70E+03 | 1.20E+01 | 2.00E+03 | 7.70E+01 | 4.35E+04 | 6.13E+04 | Gallorini 1981    | ESP                             |
| Canada                         | Prince Is. Quebec   | 1   | 1.00E-01 | 1.80E-02 | 2.02E-01 | NA       | NA       | 1.65E+00 | NA       | 8.54E-02 | NA       | NA       | NA       | NA       | NA       | 2.06E+00 | Canada EPS 1985   | UNKNOWN                         |
| AVERAGE                        |                     |     | 1.12E+02 | 3.21E+02 | 1.17E+03 | 0.00E+00 | 1.50E+02 | 4.95E+04 | 4.13E+02 | 5.00E+01 | 1.30E+03 | 1.54E+01 | 4.65E+03 | 9.63E+00 | 5.04E+04 | 1.00E+05 |                   |                                 |
| COUNT                          |                     |     | 8        | 8        | 8        | 8        | 8        | 8        | 8        | 8        | 8        | 8        | 8        | 8        | 8        | 8        |                   |                                 |
| STD DEV                        |                     |     | 1.49E+02 | 4.10E+02 | 6.64E+02 | 0.00E+00 | 8.56E+01 | 3.12E+04 | 5.46E+02 | 6.00E+01 | 5.69E+02 | 1.84E+01 | 5.39E+03 | 2.55E+01 | 5.50E+04 | 8.71E+04 |                   |                                 |
| REFUSE DERIVED FUEL FACILITIES |                     |     |          |          |          |          |          |          |          |          |          |          |          |          |          |          |                   |                                 |
| USA                            | OCC-EFW New York    | 1   | 3.84E-07 | 5.10E-07 | 1.30E-07 | 3.10E-09 | 1.05E-07 | 1.84E-06 | 7.56E-07 | 4.66E-07 | NA       | NA       | NA       | 3.23E-06 | 9.96E-06 | 1.74E-05 | NYSDEC 1986       | TWO ESPs                        |
| USA                            | Sheridan Albany NY  | 1   | 1.50E-05 | 8.00E-05 | 1.47E-07 | 1.10E-09 | 7.17E-05 | 1.92E-06 | 1.54E-05 | 9.36E-06 | NA       | NA       | NA       | 3.32E-07 | 1.26E-05 | 2.15E-04 | NYSDEC 1984       | TWO ESPs                        |

Table 6.8-2 cont.

|   |          |          |          |          |          |          |          |          |    |    |    |          |          |          |
|---|----------|----------|----------|----------|----------|----------|----------|----------|----|----|----|----------|----------|----------|
| 2 | 1.75E-05 | 2.99E-05 | 1.36E-07 | 5.84E-10 | 1.14E-04 | 8.76E-06 | 2.20E-06 | 6.24E-06 | NA | NA | NA | 1.23E-07 | 1.30E-05 | 1.92E-04 |
| 3 | 8.33E-06 | 1.07E-05 | 5.54E-08 | NA       | 1.14E-04 | 2.16E-06 | 1.54E-06 | 1.06E-06 | NA | NA | NA | 4.37E-08 | 5.55E-06 | 1.43E-04 |
| 4 | 6.66E-06 | 7.38E-06 | 8.43E-08 | NA       | NA       | 5.76E-06 | 1.32E-07 | NA       | NA | NA | NA | 4.42E-08 | 7.77E-06 | 2.70E-05 |
| 5 | 1.54E-05 | 1.97E-05 | 1.23E-07 | NA       | NA       | 5.76E-06 | 2.64E-06 | NA       | NA | NA | NA | 8.50E-08 | 1.63E-05 | 6.00E-05 |
| 6 | 7.43E-05 | 1.06E-04 | 1.65E-07 | NA       | NA       | 3.10E-05 | 1.45E-05 | NA       | NA | NA | NA | 3.70E-07 | 1.10E-05 | 2.30E-04 |

AVERAGE 1.90E-05 3.74E-05 1.21E-07 7.06E-10 4.29E-05 8.17E-06 5.31E-06 2.45E-06 0.00E+00 0.00E+00 0.00E+00 6.05E-07 1.10E-05 1.20E-04

COUNT 7 7 7 7 7 7 7 7 7 7 7 7 7 7

STD DEV 2.30E-05 3.89E-05 3.54E-08 1.09E-09 5.12E-05 9.61E-06 6.16E-06 3.51E-06 0.00E+00 0.00E+00 0.00E+00 1.00E-06 3.30E-06 8.53E-05

|||||

TOTAL AVERAGE, COUNT, AND STD DEV

AVERAGE 1.12E+02 3.21E+02 1.17E+03 7.06E-10 1.50E+02 4.95E+04 4.13E+02 5.00E+01 1.30E+03 1.54E+01 4.65E+03 9.63E+00 5.04E+04 1.00E+05

COUNT 15 15 15 15 15 15 15 15 15 15 15 15 15 15

STD DEV ERR ERR 7.50E+02 ERR ERR 3.36E+04 ERR ERR ERR ERR ERR ERR 8.34E+04

Table 6.8-2 Cont.

| COUNTRY                        | SITE                                           | RUN     | POLY AROMATIC HYDROCARBONS (ug/m <sup>3</sup> ) |                   |          |                 |                     |                   |          |          |                               |                    |                                |                               | TOTAL    | REFERENCE      |
|--------------------------------|------------------------------------------------|---------|-------------------------------------------------|-------------------|----------|-----------------|---------------------|-------------------|----------|----------|-------------------------------|--------------------|--------------------------------|-------------------------------|----------|----------------|
|                                |                                                |         | Phenan-<br>threne                               | Fluor-<br>anthene | Pyrene   | Napthal-<br>ene | Acenaph-<br>thylene | Acenaph-<br>thene | Flourene | Chrysene | Benzo(k)<br>fluoran-<br>thene | Benzo(a)<br>Pyrene | Dibenz(a,<br>h)anthr-<br>acene | Benzo(g,<br>h,i)per-<br>ylene |          |                |
| MASS BURN INCINERATORS         |                                                |         |                                                 |                   |          |                 |                     |                   |          |          |                               |                    |                                |                               |          |                |
| USA                            | Chicago<br>Northwest<br>1982                   | 1       | 2.00E-01                                        | 3.90E-02          | 9.20E-02 | NA              | NA                  | NA                | NA       | NA       | NA                            | NA                 | NA                             | NA                            | 3.31E-01 | Haile<br>1983  |
|                                |                                                | 2       | 1.10E-01                                        | 2.70E-02          | 9.10E-02 | NA              | NA                  | NA                | NA       | NA       | NA                            | NA                 | NA                             | NA                            | 2.28E-01 |                |
|                                |                                                | 3       | 3.40E-01                                        | 5.10E-02          | 7.70E-02 | NA              | NA                  | NA                | NA       | NA       | NA                            | NA                 | NA                             | NA                            | 4.68E-01 |                |
| USA                            | Hampton<br>Virginia<br>1984                    | 1       | 1.50E+02                                        | 1.10E+02          | 1.20E+02 | 6.40E+02        | 2.20E+02            | 3.00E-01          | 1.30E+01 | 7.70E+00 | 9.90E+01                      | 7.40E+00           | 0.00E+00                       | 4.30E+00                      | 1.37E+03 | Haile<br>1984  |
|                                |                                                | 2       | 2.20E+02                                        | 1.60E+02          | 2.30E+02 | 4.80E+02        | 2.50E+02            | 3.00E+00          | 1.40E+01 | 1.20E+01 | 1.60E+01                      | 1.20E+01           | 0.00E+00                       | 0.00E+00                      | 1.40E+03 |                |
|                                |                                                | 3       | 1.30E+02                                        | 7.80E+01          | 8.40E+01 | 3.80E+02        | 1.20E+02            | 1.70E+00          | 0.80E+00 | 7.00E+00 | 8.60E+00                      | 5.90E+00           | 0.00E+00                       | 1.30E+00                      | 8.25E+02 |                |
|                                |                                                | 4       | 2.50E+02                                        | 1.30E+02          | 1.60E+02 | 1.04E+03        | 3.30E+02            | 5.70E+00          | 2.40E+01 | 1.70E+01 | 2.30E+01                      | 1.40E+01           | 0.00E+00                       | 0.00E+00                      | 1.99E+03 |                |
|                                |                                                | 5       | 2.00E+02                                        | 1.30E+02          | 1.40E+02 | 5.60E+02        | 1.80E+02            | 2.40E+00          | 1.50E+01 | 2.60E+01 | 2.70E+01                      | 1.90E+01           | 1.40E-01                       | 2.50E+01                      | 1.32E+03 |                |
|                                |                                                | AVERAGE | 1.19E+02                                        | 7.60E+01          | 9.10E+01 | 3.88E+02        | 1.38E+02            | 1.64E+00          | 9.35E+00 | 8.71E+00 | 2.17E+01                      | 7.29E+00           | 1.75E-02                       | 3.83E+00                      | 8.64E+02 |                |
|                                |                                                | COUNT   | 8                                               | 8                 | 8        | 8               | 8                   | 8                 | 8        | 8        | 8                             | 8                  | 8                              | 8                             | 8        |                |
|                                |                                                | STD DEV | 9.83E+01                                        | 6.26E+01          | 8.07E+01 | 3.50E+02        | 1.20E+02            | 1.90E+00          | 8.25E+00 | 8.73E+00 | 3.09E+01                      | 6.76E+00           | 4.63E-02                       | 8.13E+00                      | 7.31E+02 |                |
| REFUSE DERIVED FUEL FACILITIES |                                                |         |                                                 |                   |          |                 |                     |                   |          |          |                               |                    |                                |                               |          |                |
| USA                            | Sheridan Ave<br>Albany NY<br>(Answers)<br>1984 | 1       | NA                                              | NA                | NA       | NA              | NA                  | NA                | NA       | 2.35E+00 | NA                            | 1.11E+00           | NA                             | NA                            | 3.46E+00 | NYSDEC<br>1985 |
|                                |                                                | 2       | NA                                              | NA                | NA       | NA              | NA                  | NA                | NA       | 3.96E-01 | NA                            | 2.50E-02           | NA                             | NA                            | 4.21E-01 |                |
|                                |                                                | 3       | NA                                              | NA                | NA       | NA              | NA                  | NA                | NA       | 1.92E-01 | NA                            | 5.00E-02           | NA                             | NA                            | 2.42E-01 |                |
|                                |                                                | 4       | NA                                              | NA                | NA       | NA              | NA                  | NA                | NA       | 4.57E-01 | NA                            | 1.31E-01           | NA                             | NA                            | 5.88E-01 |                |

Table 6.8- 2 cont.

|       |         |          |          |          |          |          |          |          |          |          |          |          |          |          |
|-------|---------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
|       | 5       | NA       | NA       | NA       | NA       | NA       | NA       | NA       | 7.83E-01 | NA       | 1.66E+00 | NA       | NA       | 2.44E+00 |
|       | 6       | NA       | NA       | NA       | NA       | NA       | NA       | NA       | 2.53E-01 | NA       | 5.86E-01 | NA       | NA       | 8.39E-01 |
|       | AVERAGE | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 7.39E-01 | 0.00E+00 | 5.94E-01 | 0.00E+00 | 0.00E+00 | 1.33E+00 |
|       | COUNT   | 6        | 6        | 6        | 6        | 6        | 6        | 6        | 6        | 6        | 6        | 6        | 6        | 6        |
|       | STD DEV | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 7.45E-01 | 0.00E+00 | 6.11E-01 | 0.00E+00 | 0.00E+00 | 1.20E+00 |
| TOTAL | AVERAGE | 6.87E+01 | 4.39E+01 | 5.33E+01 | 2.26E+02 | 7.99E+01 | 9.78E-01 | 5.44E+00 | 5.39E+00 | 1.33E+01 | 4.47E+00 | 1.20E-02 | 2.50E+00 | 5.01E+02 |
| TOTAL | COUNT   | 14       | 14       | 14       | 14       | 14       | 14       | 14       | 14       | 14       | 14       | 14       | 14       | 14       |
| TOTAL | STD DEV | 8.87E+01 | 5.66E+01 | 7.12E+01 | 3.05E+02 | 1.06E+02 | 1.54E+00 | 7.26E+00 | 7.21E+00 | 2.40E+01 | 5.71E+00 | 3.40E-02 | 6.04E+00 | 6.53E+02 |

Table 6.8- 2 cont.

| Country                        | Site                        | Run | Chlorinated Benzene Emissions (ug/M <sup>3</sup> ) |                          |                            |                            |                           |                            |                                     | REFERENCE | ENVIRONMENTAL<br>CONTROL DEVICE |
|--------------------------------|-----------------------------|-----|----------------------------------------------------|--------------------------|----------------------------|----------------------------|---------------------------|----------------------------|-------------------------------------|-----------|---------------------------------|
|                                |                             |     | Di<br>chloro<br>benzene                            | Tri<br>chloro<br>benzene | tetra<br>chloro<br>benzene | penta<br>chloro<br>benzene | hexa<br>chloro<br>benzene | total<br>chloro<br>benzene |                                     |           |                                 |
| MASS BURN INCINERATORS         |                             |     |                                                    |                          |                            |                            |                           |                            |                                     |           |                                 |
| USA                            | Chicago<br>Northwest        | 1   | NA                                                 | 0.438                    | 0.79                       | NA                         | 0.11                      | 1.338                      | EPA Study<br>[560/5-83-004]<br>1983 | ESP's     |                                 |
|                                |                             | 2   | NA                                                 | 0.457                    | 0.63                       | NA                         | 0.048                     | 1.135                      |                                     |           |                                 |
|                                |                             | 3   | NA                                                 | 1.17                     | NA                         | NA                         | 0.26                      | 1.43                       |                                     |           |                                 |
| USA                            | Hampton<br>Virginia<br>1983 | 3   | 0.0032                                             | 0.361                    | 1.985                      | 4.745                      | 1.435                     | 8.529                      | 4                                   |           |                                 |
|                                |                             | 5   | 0.654                                              | 1.181                    | 1.583                      | 5.5                        | 2.02                      | 10.858                     |                                     |           |                                 |
|                                |                             | 7   | 4.41                                               | 19.06                    | 28.66                      | 39.41                      | 11.33                     | 102.87                     |                                     |           |                                 |
| USA                            | Hampton<br>Virginia<br>1984 | 1   |                                                    |                          |                            |                            |                           |                            |                                     |           |                                 |
|                                |                             | 2   |                                                    |                          |                            |                            |                           |                            |                                     |           |                                 |
|                                |                             | 3   |                                                    |                          |                            |                            |                           |                            |                                     |           |                                 |
|                                |                             | 4   |                                                    |                          |                            |                            |                           |                            |                                     |           |                                 |
|                                |                             | 5   |                                                    |                          |                            |                            |                           |                            |                                     |           |                                 |
| Canada                         | Toronto<br>Ontario          | 1   | NA                                                 | 0.649                    | 1.88                       | 1.1                        | 0.33                      | 3.959                      | 5                                   |           |                                 |
|                                |                             | 2   | NA                                                 | 0.377                    | 0.111                      | 0.222                      | 0.235                     | 0.945                      |                                     |           |                                 |
|                                |                             | 3   | NA                                                 | 0.651                    | 2.19                       | 2.19                       | 0.574                     | 5.685                      |                                     |           |                                 |
| REFUSE DERIVED FUEL FACILITIES |                             |     |                                                    |                          |                            |                            |                           |                            |                                     |           |                                 |
| Canada                         | Hamilton                    | 1   |                                                    |                          |                            |                            |                           | 54                         | Canada's<br>Ministry<br>of the      | ESP's     |                                 |
|                                | Ontario                     | 4   |                                                    |                          |                            |                            |                           | 24.3                       |                                     |           |                                 |

Table 6.8-2 cont.

|    | Environment<br>1984 |
|----|---------------------|
| 5  | 7.7                 |
| 6  | 30.7                |
| 7  | 76.5                |
| 8  | 31                  |
| 9  | 52.8                |
| 10 | 22.3                |
| 11 | 47.5                |
| 12 | 34.5                |
| 13 | 102.5               |
| 14 | 42.4                |
| 15 | 26.3                |

Average 1.689066 2.704688 4.194333 8.861166 1.815777 31.32586

Count 9 9 9 9 9 22

Std Dev 1.375293 5.790006 8.683488 12.00073 3.422323 30.36596

Table 6.8-2 cont.

| Chlorinated Phenol Emissions (ug/M <sup>3</sup> ) |                                  |     |                        |                         |                           |                           |                           | REFERENCE                                     | ENVIRONMENTAL<br>CONTROL DEVICE |
|---------------------------------------------------|----------------------------------|-----|------------------------|-------------------------|---------------------------|---------------------------|---------------------------|-----------------------------------------------|---------------------------------|
| Country                                           | Site                             | Run | di<br>chloro<br>phenol | tri<br>chloro<br>phenol | tetra<br>chloro<br>phenol | penta<br>chloro<br>phenol | total<br>chloro<br>phenol |                                               |                                 |
| MASS BURN INCINERATORS                            |                                  |     |                        |                         |                           |                           |                           |                                               |                                 |
| USA                                               | Chicago<br>Northwest             | 1   | 0.24                   | 1.4                     | 1.5                       | 0.19                      | 3.33                      | EPA Study<br>(560/5-83-004)<br>1983           | ESPs                            |
|                                                   |                                  | 2   | 0.28                   | 1.2                     | 1.1                       | 0.16                      | 2.74                      |                                               |                                 |
|                                                   |                                  | 3   | 0.63                   | 1.9                     | 1.7                       | 0.43                      | 4.66                      |                                               |                                 |
| USA                                               | Hampton<br>Virginia<br>1983      | 3   | NA                     | 14.1                    | 4.2                       | 2.6                       | 20.9                      | 4                                             |                                 |
|                                                   |                                  | 5   | NA                     | 73.4                    | 31.5                      | 9.5                       | 114.4                     |                                               |                                 |
|                                                   |                                  | 7   | NA                     | 129.3                   | 64.5                      | 40.6                      | 234.4                     |                                               |                                 |
| USA                                               | Hampton<br>Virginia<br>1984      | 1   |                        |                         |                           |                           |                           |                                               |                                 |
|                                                   |                                  | 2   |                        |                         |                           |                           |                           |                                               |                                 |
|                                                   |                                  | 3   |                        |                         |                           |                           |                           |                                               |                                 |
|                                                   |                                  | 4   |                        |                         |                           |                           |                           |                                               |                                 |
|                                                   |                                  | 5   |                        |                         |                           |                           |                           |                                               |                                 |
| Canada                                            | Toronto<br>Ontario               | 1   | NA                     | 4.2                     | 2.8                       | 1.5                       | 8.5                       | 5                                             |                                 |
|                                                   |                                  | 2   | NA                     | 1.9                     | 1.8                       | 1.5                       | 5.2                       |                                               |                                 |
|                                                   |                                  | 3   | NA                     | 0.53                    | 2.2                       | 1.1                       | 3.83                      |                                               |                                 |
| REFUSE DERIVED FUEL FACILITIES                    |                                  |     |                        |                         |                           |                           |                           |                                               |                                 |
| Canada                                            | Hamilton<br>Wentworth<br>Ontario | 1   |                        |                         |                           |                           | 41.7                      | Canada's<br>Ministry<br>of the<br>Environment | ESPs                            |
|                                                   |                                  | 4   |                        |                         |                           |                           | 23                        |                                               |                                 |

Table 6.8-2 cont.

|    |       |      |
|----|-------|------|
| 5  | 72    | 1984 |
| 6  | 36.6  |      |
| 7  | 48    |      |
| 8  | 39.7  |      |
| 9  | 83.6  |      |
| 10 | 74.9  |      |
| 11 | 32.2  |      |
| 12 | 96.5  |      |
| 13 | 102.5 |      |
| 14 | 4.8   |      |
| 15 | 85.9  |      |

AVERAGE 0.127777 25.32535 12.36666 6.397777 51.78909

COUNT 9 9 9 9 22

STD DEV 0.207004 42.89644 20.59126 12.39597 53.57368

These compounds were selected for risk assessment based on available data on their carcinogenicity or other toxic effects and data on emissions from resource recovery facilities. Emissions of PCDD and PCDF are generally considered to be of most interest in health risk assessments since they typically result in the majority of the cancer risk associated with a project. Emissions of pollutants other than those listed above were not included in the assessment due to a lack of emissions data or the immateriality of the emissions.

#### 6.8.8 TCDD Equivalence Factors

Dioxin and furan exposure has become of increasing interest in assessing the health risks related to resource recovery facilities. In 1977, the discovery of PCDD absorbed on precipitated fly ash and in flue gas samples from waste combustion, was reported by Olie and Hutzinger (Olie and Hutzinger, Recent Developments in Mass Spectrometry in Biochemistry and Medicine, Vol.1, Plenum Publishing Company, New York, 1978). Later other individuals confirmed these findings and reported the occurrence of PCDFs.

Dioxin is a generic name given to a large number of isomers of chlorinated compounds with a similar general molecular structure. These several compounds exhibit different degrees of toxicity. Given the large number of dioxins and furans, the concept of a toxic equivalence factor (TEF) was developed to estimate the carcinogenic potential of those dioxins and furans for which no conclusive carcinogenic data exists. The majority of toxicological data currently available on dioxins and furans involves bioassays for acute lethality, enzyme induction, cell receptor binding and pathological end points. Different groups have proposed at least six methods for the determination of TEFs. Three methods have been utilized in this DEIS. These include the U.S. EPA Chlorinated Dioxins Work Group method of November 1985, the Swiss EPA approach and the California method which in a general way represent the methods which would give a range of estimates of the toxic equivalency of the various congeners. Table 6.8-3 shows the factors for each of these methods.

TABLE 6.8-3  
TCDD EQUIVALENCE FACTORS

|                                                                              | <u>U.S. EPA 11/85</u> | <u>Swiss EPA</u> | <u>California</u> |
|------------------------------------------------------------------------------|-----------------------|------------------|-------------------|
| 2,3,7,8 TCDD                                                                 | 1                     | 1                | 1                 |
| Other TCDD                                                                   | 0.01                  | 0.001            | 0.04              |
| 2,3,7,8 PeCDD                                                                | 0.5                   | 0.1              | 1.0               |
| Other PeCDD                                                                  | 0.005                 | 0.1              | 0                 |
| 2,3,7,8 HxCDD                                                                | 0.04                  | 0.1              | 0.4               |
| Other HxCDD                                                                  | 0.004                 | 0.1              | 0                 |
| 2,3,7,8 HpCDD                                                                | 0.001                 | 0.01             | 0.04              |
| Other HpCDD                                                                  | 0.00001               | 0.01             | 0                 |
| 2,3,7,8 TCDF                                                                 | 0.1                   | 0.1              | 1.0               |
| Other TCDF                                                                   | 0.001                 | 0.1              | 0                 |
| 2,3,7,8 PeCDF                                                                | 0.1                   | 0.1              | 1.0               |
| Other PeCDF                                                                  | 0.001                 | 0.1              | 0                 |
| 2,3,7,8 HxCDF                                                                | 0.01                  | 0.1              | 0.04              |
| Other HxCDF                                                                  | 0.001                 | 0.1              | 0                 |
| 2,3,7,8 HpCDF                                                                | 0.001                 | 0.01             | 0.04              |
| Other HpCDF                                                                  | <u>0.00001</u>        | <u>0.01</u>      | <u>0</u>          |
| Total                                                                        | 1.77                  | 2.05             | 4.16              |
| Total relative to<br>U.S. EPA assuming<br>equal distribution<br>of congeners | 1.0                   | 1.0              | 1.95              |

Source: MPCA, 1986

- U.S. EPA 1985 - The U.S. EPA method used the relative potencies of 2,3,7,8 tetrachloro dibenzo-p-dioxin (TCDD) and 2,3,7,8 hexachloro dibenzo-p-dioxin (HxCDD) obtained from carcinogenic studies as well as a variety of other toxicity end points for other dibenzo-dioxin and dibenzo furan isomers. The method limits the resolution in interpreting the data to generally orders of magnitude.
- Swiss EPA - The Swiss EPA uses data from AHH enzyme induction studies to determine relative potencies. This method assumes equal potencies for all isomers of a given group.
- California - The California Department of Health Services recently published a report outlining their criteria for determining TEFs. The method uses carcinogenic potencies of 2,3,7,8 TCDD and 2,3,7,8 HxCDD which were obtained from carcinogenic bioassays. It assumes zero potency for isomers not chlorinated in the four lateral 2,3,7,8 positions.

#### 6.8.9 Dose Response

The U.S. EPA Cancer Assessment Group (CAG) has estimated the upper bound (95 percent confidence by a Chi square goodness of fit method) slope of a specialized dose response model for approximately 50 carcinogens. The magnitude of risk can be calculated from the potency slopes. Cancer risk is the product of the potency slope times the calculated lifetime daily dose.

#### 6.8.10 Exposure Assessment

The three main exposure routes for the pollutants considered are: inhalation, dermal exposure from contaminated soil, and ingestion of soil. The purpose of exposure assessment is to determine a dose of pollutant, usually calculated as an average lifetime daily dose, which might reasonably be attained by an individual residing near the facility. It has been shown that dermal absorption of pollutants from

operations such as the proposed facility represent a minor exposure route relative to inhalation and ingestion (Fred C. Hart. 1984). The exposure was calculated based on a lifetime exposure of 70 years.

#### Inhalation

Inhalation exposure was estimated for the maximally exposed receptor by noting the ambient air concentrations of pollutants based on the dispersion modelling undertaken in Section 6.1 (in  $\mu\text{g}/\text{m}^3$ ) and assuming a 70 kg human, breathing  $20 \text{ m}^3$  (moderate exercise) of air per day. The daily lifetime air intake of pollutant in  $\text{mg}/\text{kg}/\text{day}$  was thereby calculated. It was assumed that the entire dose is respirable.

The assessment of cancer risk from exposure using USEPA potency slopes requires input of a lifetime average daily dose. It can be calculated that exposure to a carcinogen for the first 30 years of life yields a cancer risk equivalent to a lifetime exposure of 30/70 of the daily exposure. The cancer risk assessment used a lifetime daily dose from inhalation which was equal to 30/70 of the calculated lifetime daily dose, because of the presumed 30 year life of the facility.

The equivalent dose per day of 2, 3, 7, 8 TCDD was calculated using three methods; the USEPA, the Swiss EPA, and the California method. A risk assessment was provided for each of the three methods.

#### Ingestion

Humans may be exposed to emissions from the facility by ingestion of soil into which pollutants are deposited. For the purpose of this risk assessment, the quantity of 100 mg/day of soil based on Hart 1984 was assumed to be ingested. It was assumed that the exposure between house dusts and outdoor soils is not significantly different, although it has been reported that indoor dust is likely to have a lower concentration of PCDD/PCDF than outdoor soils due to the ventilation effect of closed windows, etc. (Bay Area Resource Recovery Project, Combustion Engineering, P.4-26).

Potential emissions from the facility would be continuous so that individuals would be exposed to progressively higher concentrations in soils and dusts as the result of deposition during the 30-year operating life of the plant. After the plant is no longer operational, an individual would be exposed to a constant concentration of dioxin in soil. Dioxins have been observed however, to degrade through biodegradation as well as photodegradation. Studies in Sweden among others indicate that the half life of 2,3,7,8-TCDD in the ground is about 10 years (Memo on Dioxin Emissions From Waste Combustion, Swedish EPA, Technical Department, Disposal and Recycling Unit, February 11, 1985). Therefore, some reduction in soil exposure would be observed for years 40 through 70.

The following assumptions were made in the DEIS analysis: all of a pollutant is adsorbed to particles; PCDD/PCDF has a half life of 10 years, a deposition rate of 1.0 cm/sec (McMahon and Denison, 1979), was used; soil density is 1.6 g/cm<sup>3</sup>; and an average individual weighs 70 kg. The concentration was calculated by assuming an increase for 30 years, followed by a concentration for 40 years with the appropriate adjustment for the 10 year half life of 2, 3, 7, 8-TCDD equivalents.

#### 6.8.11 Results of Risk Assessment for Maximally Exposed Individual

The risk assessment was undertaken utilizing three different toxic equivalency factors (TEFs) for estimating the equivalent amount of 2, 3, 7, 8-TCDD emitted. The three methods were previously described as: the USEPA, the Swiss EPA, and the California method. Results are presented for all three cases.

The risk assessment was also calculated for two distinct potential operating scenarios. One scenario is representative of facilities emissions based on an average emissions rate for 21 North American and European facilities. The second scenario represents worst case facility emissions based on an emissions rate for the SWARU RDF facility in Canada. The total PCDD & PCDF emissions from the SWARU facility were 8820 ng/m<sup>3</sup>. The next highest emissions rate for an RDF facility as previously shown in Table 6.8-1 is 1,545 ng/m<sup>3</sup> for an

Occidental Chemical RDF plant in New York. As can be seen in that table the emissions for the SWARU plant are significantly above the average. It is not expected that the proposed facility will emit pollutants at the rate monitored for the SWARU facility. During the testing for the SWARU facility, documented operating problems were observed requiring additional testing. Due to the operating difficulties ("Determination of PCDD, PCDF, and chlorophenols in Air Emissions and Other Process Streams at SWARU in Hamilton," Report No. ARB-02-84-ETRD, Ministry of Environment Canada) and the fact that the UPA boilers are high efficiency utility boilers, it is expected that the proposed facility's emissions would be significantly less than those for the SWARU facility. In the interest of conservatism, however, a worst case risk assessment has been calculated based on the emissions from this facility.

#### USEPA TEF Method

Table 6.8-4 shows the cancer risk estimate for the maximally exposed individual from facility emissions. The maximally exposed individual represents that receptor where the highest modeled ambient concentrations were predicted. The maximally exposed receptor is located northwest of the UPA facility in the City of Elk River. The maximally exposed individual represents a theoretical maximum exposure for a person located 24 hours per day, 365 days per year, for 70 years at the point of highest concentration. It is exceedingly unlikely that a particular individual would be continuously exposed for 70 years to the maximum emissions from the facility. The analysis therefore represents a theoretical worst case. The cancer risk from the proposed facility based on an average emissions rate is estimated to be 0.1 per hundred thousand. If it is assumed that the proposed facility emits at a rate comparable to the SWARU RDF plant in Canada, the worst case cancer risk is 0.6 per hundred thousand as shown in Table 6.8-5.

TABLE 6.8-4

RISK ASSESSMENT FOR MAXIMALLY EXPOSED INDIVIDUAL -  
US EPA TEF AND AVERAGE EMISSIONS RATE

Risk Calculations (US EPA) - Average Emissions Rate

|                     | <u>Air Dose</u> | <u>Soil Dose</u> | <u>Potency Slope</u> | <u>Risk</u> |
|---------------------|-----------------|------------------|----------------------|-------------|
| Hexachlorobenzene   | 8.82E-13        | 6.08E-12         | 1.67E+00             | 1.16E-11    |
| Trichlorophenol     | 1.23E-11        | 8.45E-11         | 1.99E-02             | 1.93E-12    |
| Total PCB's         | 1.99E-13        | 1.37E-12         | 4.34E+00             | 6.80E-12    |
| 2,3,7,8-TCDD Equiv. | 6.75E-12        | 4.65E-13         | 1.56E+05             | 1.13E-06    |
| Arsenic             | 3.59E-12        | 2.46E-11         | 1.50E+01             | 4.25E-10    |
| Beryllium           | 9.36E-14        | 0.00E+00         | 2.60E+00             | 2.43E-13    |
| Cadmium             | 2.66E-11        | 0.00E+00         | 6.10E+00             | 1.62E-10    |
| Chromium            | 7.28E-12        | 0.00E+00         | 4.10E+01             | 2.99E-10    |
| Nickel              | 2.54E-12        | 0.00E+00         | 1.15E+00             | 2.92E-12    |
| PAH                 | 1.14E-11        | 7.85E-11         | 1.15E+01             | 1.03E-09    |

Source: ERT, 1986.

TABLE 6.8-5  
RISK ASSESSMENT FOR MAXIMALLY EXPOSED INDIVIDUAL -  
USEPA TEF AND WORST CASE EMISSIONS RATE

Risk Calculations (USEPA) - Worst Case

|                     | <u>Air Dose</u> | <u>Soil Dose</u> | <u>Potency Slope</u> | <u>Risk</u> |
|---------------------|-----------------|------------------|----------------------|-------------|
| Hexachlorobenzene   | 1.20E-12        | 8.25E-12         | 1.67E+00             | 1.58E-11    |
| Trichlorophenol     | 2.77E-11        | 1.91E-10         | 1.99E-02             | 4.35E-12    |
| Total PCB's         | 2.21E-13        | 1.53E-12         | 4.34E+00             | 7.60E-12    |
| 2,3,7,8-TCDD Equiv. | 3.83E-11        | 2.64E-12         | 1.56E+05             | 6.38E-06    |
| Arsenic             | 4.77E-12        | 3.29E-11         | 1.50E+01             | 5.64E-10    |
| Beryllium           | 9.37E-14        | 0.00E+00         | 2.60E+00             | 2.44E-13    |
| Cadmium             | 2.52E-11        | 0.00E+00         | 6.10E+00             | 1.54E-10    |
| Chromium            | 1.11E-11        | 0.00E+00         | 4.10E+01             | 4.56E-10    |
| Nickel              | 4.54E-12        | 0.00E+00         | 1.15E+00             | 5.22E-12    |
| PAH                 | 3.13E-11        | 2.16E-10         | 1.15E+01             | 2.85E-09    |

Source: ERT, 1986.

#### Swiss EPA TEF Method

Table 6.8-6 depicts the cancer risk estimate for the maximally exposed individual from the proposed facility based on an average emission rate at 0.9 per hundred thousand. Assuming the worst case SWARU emissions rate, the cancer risk is 6.0 per 100,000 as shown in Table 6.8-7.

#### California TEF Method

Table 6.8-8 represents an estimate of the cancer risk estimate for the maximally exposed individual. The cancer risk from the proposed facility based on an average emissions rate is 0.5 per hundred thousand. Assuming the worst case SWARU emissions rate, the cancer risk is 3.0 per 100,000 as shown in Table 6.8-9.

#### Summary

Table 6.8-10 summarizes the modeled cancer risk assuming the three different TEF methods under two different operating modes. When it is assumed that facility emissions will be equal to those for the SWARU facility, the expected cancer risk exceeds the Minnesota Department of Health Risk Guideline of one per 100,000 using the SWISS EPA and California TEF's. It is not expected that the proposed facility would operate in a manner similar to the SWARU facility.

#### 6.8.12 Results of Risk Assessment for Average Individual Exposed to Emissions

In addition to the risk to the maximally exposed individual receptor, an estimate of the increased cancer risk to an average individual located anywhere in Elk River is shown in Table 6.8-11. The Table depicts the estimated risk under the two operating scenarios: average facility emissions and risk based on worst case emissions from the SWARU plant in Canada.

TABLE 6.8-6

RISK ASSESSMENT FOR MAXIMALLY EXPOSED INDIVIDUAL -  
SWISS EPA TEF AND AVERAGE EMISSIONS RATE

Risk Calculations (SWISSEPA) - Average Emissions Rate

|                     | <u>Air Dose</u> | <u>Soil Dose</u> | <u>Potency Slope</u> | <u>Risk</u> |
|---------------------|-----------------|------------------|----------------------|-------------|
| Hexachlorobenzene   | 8.82E-13        | 6.08E-12         | 1.67E+00             | 1.16E-11    |
| Trichlorophenol     | 1.23E-11        | 8.45E-11         | 1.99E-02             | 1.93E-12    |
| Total PCB's         | 1.99E-13        | 1.37E-12         | 4.34E+00             | 6.80E-12    |
| 2,3,7,8-TCDD Equiv. | 5.42E-11        | 3.37E-12         | 1.56E+05             | 9.03E-06    |
| Arsenic             | 3.59E-12        | 2.48E-11         | 1.50E+01             | 4.25E-10    |
| Beryllium           | 9.36E-14        | 0.00E+00         | 2.60E+00             | 2.43E-13    |
| Cadmium             | 2.66E-11        | 0.00E+00         | 6.10E+00             | 1.62E-10    |
| Chromium            | 7.28E-12        | 0.00E+00         | 4.10E+01             | 2.99E-10    |
| Nickel              | 2.54E-12        | 0.00E+00         | 1.15E+00             | 2.92E-12    |
| PAH                 | 1.14E-11        | 7.85E-11         | 1.15E+01             | 1.03E-09    |

Source: ERT, 1986

TABLE 6.8-7

RISK ASSESSMENT FOR MAXIMALLY EXPOSED INDIVIDUAL -  
SWISS EPA TEF AND WORST CASE EMISSIONS RATE

Risk Calculations SWISSEPA) - Worst Case

|                     | <u>Air Dose</u> | <u>Soil Dose</u> | <u>Potency Slope</u> | <u>Risk</u> |
|---------------------|-----------------|------------------|----------------------|-------------|
| Hexachlorobenzene   | 1.20E-12        | 8.25E-12         | 1.67E+00             | 1.58E-11    |
| Trichlorophenol     | 2.77E-11        | 1.91E-10         | 1.99E-02             | 4.35E-12    |
| Total PCB's         | 2.21E-13        | 1.53E-12         | 4.34E+00             | 7.60E-12    |
| 2,3,7,8-TCDD Equiv. | 3.60E-10        | 2.48E-11         | 1.56E+05             | 6.01E-05    |
| Arsenic             | 4.77E-12        | 3.29E-11         | 1.50E+01             | 5.64E-10    |
| Beryllium           | 9.37E-14        | 0.00E+00         | 2.60E+00             | 2.44E-13    |
| Cadmium             | 2.52E-11        | 0.00E+00         | 6.10E+00             | 1.54E-10    |
| Chromium            | 1.11E-11        | 0.00E+00         | 4.10E+01             | 4.56E-10    |
| Nickel              | 4.54E-12        | 0.00E+00         | 1.15E+00             | 5.22E-12    |
| PAH                 | 3.13E-11        | 2.16E-10         | 1.15E+01             | 2.85E-09    |

Source: ERT, 1986.

TABLE 6.8-8

RISK ASSESSMENT FOR MAXIMALLY EXPOSED INDIVIDUAL -  
CALIFORNIA TEF AND AVERAGE EMISSIONS RATE

Risk Calculations (CALIFORNIA) - Average Emissions Rate

|                     | <u>Air Dose</u> | <u>Soil Dose</u> | <u>Potency Slope</u> | <u>Risk</u> |
|---------------------|-----------------|------------------|----------------------|-------------|
| Hexachlorobenzene   | 8.82E-13        | 6.08E-12         | 1.67E+00             | 1.16E-11    |
| Trichlorophenol     | 1.23E-11        | 8.45E-11         | 1.99E-02             | 1.93E-12    |
| Total PCB's         | 1.99E-13        | 1.37E-12         | 4.34E+00             | 6.80E-12    |
| 2,3,7,8-TCDD Equiv. | 3.26E-11        | 2.25E-12         | 1.56E+05             | 5.44E-06    |
| Arsenic             | 3.59E-12        | 2.48E-11         | 1.50E+01             | 4.25E-10    |
| Beryllium           | 9.36E-14        | 0.00E+00         | 2.60E+00             | 2.43E-13    |
| Cadmium             | 2.66E-11        | 0.00E+00         | 6.10E+00             | 1.62E-10    |
| Chromium            | 7.28E-12        | 0.00E+00         | 4.10E+01             | 2.99E-10    |
| Nickel              | 2.54E-12        | 0.00E+00         | 1.15E+00             | 2.92E-12    |
| PAH                 | 1.14E-11        | 7.85E-11         | 1.15E+01             | 1.03E-09    |

Source: ERT, 1986.

TABLE 6.8-9

RISK ASSESSMENT FOR MAXIMALLY EXPOSED INDIVIDUAL -  
CALIFORNIA TEF AND WORST CASE EMISSIONS RATE

Risk Calculations (CALIFORNIA) - Worst Case

|                     | <u>Air Dose</u> | <u>Soil Dose</u> | <u>Potency Slope</u> | <u>Risk</u> |
|---------------------|-----------------|------------------|----------------------|-------------|
| Hexachlorobenzene   | 1.20E-12        | 8.25E-12         | 1.67E+00             | 1.58E-11    |
| Trichlorophenol     | 2.77E-11        | 1.91E-10         | 1.99E-02             | 4.35E-12    |
| Total PCB's         | 2.21E-13        | 1.53E-12         | 4.34E+00             | 7.60E-12    |
| 2,3,7,8-TCDD Equiv. | 1.90E-10        | 1.31E-11         | 1.56E+05             | 3.17E-05    |
| Arsenic             | 4.77E-12        | 3.29E-11         | 1.50E+01             | 5.64E-10    |
| Beryllium           | 9.37E-14        | 0.00E+00         | 2.60E+00             | 2.44E-13    |
| Cadmium             | 2.52E-11        | 0.00E+00         | 6.10E+00             | 1.54E-10    |
| Chromium            | 1.11E-11        | 0.00E+00         | 4.10E+01             | 4.56E-10    |
| Nickel              | 4.54E-12        | 0.00E+00         | 1.15E+00             | 5.22E-12    |
| PAH                 | 3.13E-11        | 2.16E-10         | 1.15E+01             | 2.85E-09    |

Source: ERT, 1986.

TABLE 6.8-10  
MAXIMALLY EXPOSED INDIVIDUAL CANCER RISK FROM  
PROPOSED RDF COMBUSTION

| <u>Case</u> | <u>USEPA TEF</u> | <u>SWISS EPA TEF</u> | <u>CALIFORNIA TEF</u> |
|-------------|------------------|----------------------|-----------------------|
| Facility    | 1.0              | 9.0 E-6              | 5.0 E-6               |
| Average     |                  |                      |                       |
| Worst Case  | 6.0 E-6          | 6.0 E-5              | 3.0 E-5               |

Source: ERT, 1986

- Notes: 1) Facility average was based on an average emissions rate for 21 European and North American RDF or mass burn facilities.
- 2) Worst case estimate was based upon emissions data for the SWARU facility for PCDD & PCDF. Of the data utilized in the DEIS, the SWARU facility generally had the highest averaged measured emissions of PCDD & PCDF. This facility is of the RDF design.

TABLE 6.8-11  
AVERAGE INDIVIDUAL CANCER RISK  
FROM PROPOSED RDF COMBUSTION

| <u>Case</u>         | <u>USEPA TEF</u> | <u>SWISS EPA TEF</u> | <u>CALIFORNIA TEF</u> |
|---------------------|------------------|----------------------|-----------------------|
| Facility<br>Average | 2.0 E-7          | 2.0 E-6              | 1.0 E-6               |
| Worst Case          | 1.0 E-6          | 1.0 E-5              | 7.0 E-5               |

Source: ERT, 1986

- Notes: 1) Facility average was based on an average emissions rate for 21 European and North American RDF or mass burn facilities.
- 2) Worst case estimate was based upon emissions data for the SWARU facility of PCDD & PCDF.

Utilizing data on average emissions for 21 facilities in Europe and North America, the expected increased cancer risk from the facility is: 0.02 per hundred thousand using the USEPA method; 0.2 per hundred thousand using the Swiss EPA TEF; and 0.1 per hundred when using the California method. It should be noted that the MDH guideline for acceptable risk is one per 100,000.

Assuming a worst case emissions rate for the SWARU Canada facility results in an average risk estimate of: 0.1 per hundred thousand for the USEPA method; 1.0 per 100,000 for the Swiss EPA method; and 0.7 per hundred thousand for the California method.

#### 6.8.13 Community Risk

A community risk based on population cancer risk for the proposed facility was also estimated. The population risk was estimated by applying the average individual cancer risk estimates and assuming an exposed population of 10,000 people within approximately 6 miles of Elk River.

Table 6.8-12 depicts the estimated increased population cancer risk from the facility assuming an average emission rate and the worst case emissions rate for the SWARU facility in Canada. Utilizing the facility average emissions rate results in an expected additional increase in cancer cases of: 0.02 cancers in the population for the USEPA method; 0.02 cancers for the Swiss EPA method; and 0.01 additional cancers for the California method. Similarly, utilizing the SWARU emissions rate results in an expected additional increase in cancer cases of: 0.01 additional cancers in the population for the USEPA method; 0.1 cancers for the Swiss EPA method; and 0.07 cancers for the California method.

TABLE 6.8-12  
INCREASED POPULATION CANCER RISK FROM  
PROPOSED RDF COMBUSTION

| <u>Case</u>         | <u>Additional Cancer Cases</u> |                      |                       |
|---------------------|--------------------------------|----------------------|-----------------------|
|                     | <u>USEPA TEF</u>               | <u>SWISS EPA TEF</u> | <u>CALIFORNIA TEF</u> |
| Facility<br>Average | 0.002                          | 0.02                 | 0.01                  |
| Worst Case          | 0.01                           | 0.1                  | 0.07                  |

Source: ERT, 1986.

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**APPENDIX A**

**DEFINITIONS PERTAINING TO WASTE ASSOCIATED  
WITH ANOKA COUNTY RDF FACILITY**

## APPENDIX A

### DEFINITIONS PERTAINING TO WASTE ASSOCIATED WITH THE ANOKA COUNTY RDF FACILITY

"Acre-foot" is a volume equal to 1,613 cubic yards. Based on Metropolitan Council staff estimates, there are approximately 806.5 tons of waste received at a landfill per acre-foot of landfill space used.<sup>1</sup>

"Aluminum" is a light, grey nonferrous metal, typically discarded as scrap beverage cans, house siding, cookingware, and furniture.<sup>1</sup>

"Acceptable Waste": Garbage, refuse, and other municipal solid waste delivered to the facility from residential, commercial, industrial and community activities but does not include Unacceptable Waste.<sup>2</sup>

"Ash": Material resulting from the combustion of RDF. The RDF burns in a semi-suspension system. The lighter fraction of the RDF burns in suspension above the stoker and generates fly ash. The heavier portion burns on the stoker grate and generates bottom ash. A higher percentage of fly ash than bottom ash is produced. The ash has a high carbon content and is corrosive. Fly ash is fine grained with approximately 80 percent less than 30 microns in particle size. Unit weight of fly ash is approximately 25 lbs/c.f. Bottom ash is coarser grained with 98 percent smaller than 1-1/2" and 50 percent smaller than 1/4", by weight. The unit weight is approximately 45 lbs/c.f.

"Compostable yard waste" includes leaves, grass clippings and other organic wastes from lawn and garden maintenance that can readily be transformed into a usable soil amendment through controlled biological degradation.<sup>1</sup>

"Composting" means the controlled biological decomposition of selected solid waste in a manner resulting in a humus-like final product that can be used as a soil amendment.<sup>1</sup>

"Backyard composting" means small-scale composting of yard and garden wastes by individual homeowners on their own property.

"Centralized composting" means composting of wastes on a larger scale, such as at neighborhood or city-wide composting sites.

"Co-composting" is the composting of sewage sludge or septage with municipal solid waste.

"Corrugated containers" consist of kraft linerboard cartons with corrugated paper, typically used to ship materials. They do not include non-corrugated containers such as chipboard or single-ply boxes (for example, a cereal carton). Some cartons that are heavily coated or waxed and used to ship meats and vegetables are not recyclable, and are classified as "other organics."<sup>1</sup>

"Construction and demolition wastes" include bricks, wood, paving, building materials and rubble resulting from construction, remodeling, repair and demolition.<sup>1</sup>

"Demolition debris waste" means solid waste resulting from the demolition or construction of buildings, roads and other man-made structures including concrete, brick, bituminous concrete, wood and masonry.<sup>3</sup>

"Excess Waste": Contracted Waste in excess of the Guaranteed Annual Tonnage, not to exceed 46,800 tons per year.<sup>2</sup>

"Ferrous scrap" consists of scrap iron and steel items, including steel food and beverage cans. Iron and steel scrap is any waste material to which a magnet adheres. Bi-metal cans (ferrous cans with an aluminum top) are classified as ferrous scrap, as is any item that is at least 75 percent ferrous by volume. Stainless steel scrap (a shiny metal product used for its non-corrosive property and commonly found in appliances and kitchen counter tops) is considered ferrous.<sup>1</sup>

"Ferrous containers" are steel and bi-metal food or beverage cans and small, clean metal pails.

"Garbage" means discarded material resulting from the handling, processing, storage, preparation, serving, and consumption of food.<sup>3</sup>

"Glass bottles and jars" consist only of glass, food and beverage containers.<sup>1</sup>

"Hazardous waste" means any refuse, sludge, or other waste material or combinations of refuse, sludge or other waste materials or discarded material, or a combination of refuse or discarded materials, in solid, semisolid, liquid, contained gaseous form, which because of the quantity, concentration, or chemical, physical, or infectious characteristics may (a) cause or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible illness; or that cannot be handled by routine waste management techniques because it (b) poses a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed. Categories of hazardous waste materials include, but are not limited to

explosives, flammables, oxidizers, poisons, irritants and corrosives. Hazardous waste does not include source, special nuclear, or by-product material as defined by the Atomic Energy Act of 1954, as amended. (Minn. Stat., sec. 116.06, subd. 13)<sup>1</sup>

"Identified recoverable materials" or "identified recyclables" means materials that can be separated from solid waste and recovered for reuse in their original form or for use in manufacturing and which have been identified in the Council's solid waste guide (see Table 4-5).<sup>1</sup>

"Industrial solid waste" is solid waste resulting from industrial processes and manufacturing. It does not include hazardous wastes.

"Infectious waste" means waste originating from the diagnosis, care, or treatment of a person or animal that has been or may have been exposed to a contagious or infectious disease. Infectious waste includes:<sup>3</sup>

A. All wastes originating from persons placed in isolation for control and treatment of an infectious disease.

B. Bandages, dressings, casts, catheters, tubing, and similar disposal items, which have been in contact with wounds, burns, anatomical tracts or surgical incisions and which are suspect or have been medically verified as infectious.

C. All anatomical waste, including human and animal parts or tissues.

D. Laboratory and pathology waste of an infectious nature which has not been autoclaved.

"Industrial waste" means all solid waste generated from an industrial or manufacturing process and solid waste generated from non-manufacturing activities such as service and commercial establishments. Industrial waste does not include office materials, restaurant and food preparation waste, discarded machinery, demolition debris waste, or household refuse.<sup>3</sup>

"Mixed municipal solid waste" means garbage, refuse, and other solid waste from residential, commercial, industrial and community activities that is generated and collected in aggregate, but does not include auto hulks, street sweepings, ash, construction debris, mining waste, sludges, tree and agricultural wastes, tires, and other materials collected, processed and disposed of as separate waste streams (Minn. Stat., sec. 115A.03, subd. 21).<sup>1</sup>

"Mixed waste paper" consists of all short- and long-fiber papers that can be repulped. It includes printing, writing, and computing papers, magazines, food cartons, envelopes, grocery sacks and other commercial and residential waste fiber. It does not include items contaminated by other materials such as metal (an orange juice can), plastics (an envelope window), wax (milk carton) or other nonpaper materials, or waste paper contaminated by food wastes.<sup>1</sup>

"Mulching" means the use or placement of grass clippings or other organic materials over a lawn or garden so as to improve conditions for vegetative growth.<sup>1</sup>

"Newspaper" consists of printed, groundwood newsprint, including glossy advertising inserts and Sunday-edition magazines.<sup>1</sup>

"Non-processible Waste": Acceptable waste which cannot be processed, including but not limited to occasional beds, mattresses, sofas, refrigerators, washing machines, bicycles, and baby carriages, all of which waste has been derived from Contracted Waste or Surplus Waste.<sup>2</sup>

"Other inorganics" consist of other noncombustible, nonmetallic material  
such as rocks and ceramics.<sup>1</sup>

"Other nonferrous" consists of metals such as copper, brass, zinc and lead.<sup>1</sup>

"Other organics" consist of combustible and compostable waste not otherwise categorized. They include food waste, plastics, rubber, textiles, leather and paper that is not repulpable, as well as small quantities of other materials so mixed as to not be recyclable.<sup>1</sup>

"Process rejects": Materials removed from processable waste during RDF processing, which includes such wastes as steel banding, baling wire, cans of solvents, stumps, logs, propane tanks, gasoline cans, auto parts, grit, stones, small pieces of glass or non-ferrous metals (ERT).

"Processed waste" means mixed municipal solid waste that has (a) yard wastes and identified recoverable materials removed and (b) been subject to a process that oxidizes part or all of its organic component or any other process resulting in an organically stabilized material.<sup>1</sup>

"Processible waste" means waste materials that can be source separated or otherwise reclaimed for their material or fuel value. Waste materials that cannot be source separated or reclaimed because of emergency situations will not be considered processable waste.<sup>1</sup>

"Radioactive waste" has the meaning given in Minnesota Statutes, section 116C.71, subdivision 6.<sup>3</sup>

"Recovered materials": All materials except RDF, including ferrous metals, which are derived from Contracted Waste or Surplus Waste and are not landfilled.<sup>2</sup>

"Refuse-derived fuel (RDF)" means the fraction of processed municipal waste that is shredded and can be used as fuel in a boiler; it consists of lighter weight materials such as paper products, with metals, glass, and other non-combustible materials removed.<sup>1</sup>

"Residential solid waste" means the garbage, rubbish, trash and other solid waste resulting from normal household activities.<sup>1</sup>

"Refuse" means putrescible and nonputrescible solid wastes, including garbage, rubbish, ashes, incinerator ash, incinerator residue, street cleanings, and market and industrial solid wastes, and including municipal treatment wastes which do not contain free moisture.<sup>3</sup>

"Residuals or residue" means waste materials left after recovery of recyclables and processing of remaining wastes, and includes such materials as particles of glass, aluminum, non-ferrous metals, and "other organics". See definition of "other organics".<sup>1</sup>

"Rubbish" means nonputrescible solid wastes, including ashes, consisting of both combustible and noncombustible wastes, such as paper, cardboard, tin cans, yard clippings, wood, glass, bedding, crockery, or litter of any kind.<sup>3</sup>

"Solid Waste" means garbage, refuse, sludge from a water supply treatment plant or air contaminant treatment facility, and other discarded waste materials and sludges, in solid, semi-solid, liquid, or contained gaseous form, resulting from industrial, commercial, mining, and agricultural operations, and from community activities, but does not include hazardous waste; animal waste used as fertilizer; earthen fill, boulders, rock, sewage sludge; solids, or dissolved material in domestic sewage or other common pollutants in water resources, such as silt, dissolved or suspended solids in industrial waste water effluents or discharges which are point sources subject to permits under Section 402 of the federal water pollution control act, as amended.<sup>3</sup>

"Solid Waste": All materials or substances discarded or rejected as being spent, useless, worthless, or in excess to the owners at the time of such discard or rejection, including, but not limited to: garbage; refuse; industrial and commercial waste; sludges from air or water pollution control facilities or water supply treatment facilities; rubbish; ashes; and

offal; but excluding: Hazardous Waste, sewage and other highly diluted, water-carried materials or substances and those in gaseous form; or special nuclear or by-product material within the meaning of the Atomic Energy Act of 1954, as amended.<sup>2</sup>

"Solid waste" is garbage, refuse and other discarded solid materials. It includes solid waste materials resulting from industrial, commercial and agricultural operations, and from community activities. Solid waste does not include animal waste used as fertilizer; earthen fill, boulders, rock and other materials normally handled in construction operations; solids or dissolved material in domestic sewage or suspended solids in industrial wastewater effluents; dissolved materials in irrigation return flows; or other common water pollutants (Minnesota Pollution Control Agency, Solid Waste Regulation No.1).<sup>1</sup>

"Sewage sludge" means the solid and associated liquids in municipal wastewater that are encountered and concentrated by a municipal wastewater treatment plant for disposal at a sewage sludge disposal facility. Sewage sludge does not include sludge incinerator residues and grit, scum, screenings removed from other solids during wastewater treatment.<sup>1</sup>

"Source separation" means separation of recyclable or compostable materials by the waste generator prior to collection.<sup>1</sup>

"Special wastes" are nonhazardous wastes that are not classified as mixed municipal solid waste. They include, but are not limited to construction debris, ash, street sweepings, mining waste, sludges, tree and agricultural wastes and tires.<sup>1</sup>

"Unacceptable waste": Waste in quantities which would likely pose a threat to health or safety, or to the environment which may cause damage to, or materially adversely affect the operation of the facility, including but not limited to: explosives, hospital, pathological and biological waste; Hazardous Waste and chemicals and radioactive materials; oil sludges, asbestos in identifiable quantities; cesspool or other human waste; human or animal remains; street sweepings; ash; mining waste; sludges; demolition debris; waste with excess moisture; hazardous refuse of any kind, such as cleaning fluids, crank case oils, cutting oils, paints, acids, caustics, poisons, drugs or other materials that may be agreed to from time to time by the parties. If, at any time, any governmental agency or unit having appropriate jurisdiction shall determine that certain chemicals or other substances are harmful, toxic or dangerous, the County and the Vendor shall agree that such chemicals or other substances shall be Unacceptable Waste.<sup>2</sup>

"Unprocessed mixed municipal solid waste" means mixed municipal solid waste from which yard waste and identified recoverable materials have not been excluded and which has not been subject to a process which oxidizes part or all of its organic component or any other process resulting in an organically stabilized residue.<sup>1</sup>

"Unprocessible waste" means waste materials that cannot be source separated or otherwise reclaimed for their material or fuel value.<sup>1</sup>

"Waste reduction" is the process of reducing the amount of solid waste generated. It includes product reuse, increased product life, reduced material use in product design, and decreased consumption of products. It also includes activities such as mulching/backyard composting of yard waste.<sup>1</sup>

Wooden waste" consists of waste generated from tree trimming or cutting of trees, and discarded lumber. The following items are included: tree trimmings and shavings (wood chips), discarded lumber from home or commercial construction sites, and other miscellaneous wooden wastes.<sup>1</sup>

"White Goods" means discarded stoves, refrigerators, washing machines, dryers and other bulky enamelled metallic items.

"Yard waste" means leaves, grass clippings or other organic material created as result of lawn and garden maintenance.

#### SOURCES FOR DEFINITIONS

1. Solid Waste Management Development Guide/Policy Plan, Adopted March 14, 1985. Metro Council of Twin Cities Area, Publication No. 12-85-059.
2. Request for Proposal, Anoka County (for RDF facility), June 1985.
3. Revised Solid Waste Rules, Preliminary Draft, July 1, 1985. MPCA.

Source: S.D. Meyer et al, "Ash Management Considerations for Refuse Fired Boilers," Proceedings of 1984 National Waste Processing Conference, ASME.